

MONONGALIA GENERAL HOSPITAL

MORGANTOWN, WV

TECHNICAL ASSIGNMENT II

OCTOBER 24, 2008

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CONSTRUCTION MANAGEMENT

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Executive Summary

Detailed Project Schedule

A detailed schedule for the entire project, including renovations on the existing hospital building, was developed to illustrate the construction sequencing from phase to phase. Breaking the project into zones aided in progressing activities along, speeding up the schedule, and reducing congestion in and around the building. Construction on the addition spans 25 months from 4/17/06 to 5/16/08. The renovations span 15 months from 7/21/08 to 10/16/09.

Site Layout Planning

A site layout plan was developed for the exterior enclosure and façade construction phase. During this phase the brick veneer façade is constructed as well as the installation of curtain walls. The use of 3-D modeling was incorporated as a visual aid. Multiple views from around the site during this phase give the viewer a better understanding of the site layout and the location of facilities and equipment. A traditional plan view with labeling of important areas and items is also included.

Detailed Structural System Estimate

A detailed estimate of the structural systems was calculated. This includes the cast in place reinforced concrete and the additional structural steel members that make up the Hazel Ruby McQuain Tower's structural system. The estimate total added up to be \$ 4,266,794.13. This cost is 6.6% of the total construction cost. The estimated new area of occupied space in the addition is 210,000 SF, bringing the estimated structure cost to be \$20.32/SF.

General Conditions Estimate

A general conditions estimate was calculated for the project. Site and project conditions were taken into account when determining which costs are necessary. Turner Construction Company acted strictly as a construction manager on the project which varied what items are included or excluded in the general conditions estimate. The onsite project staff costs are broken down to calculate time spent on the project. Additional support personnel were added to the costs for their slight contributions to the project.

Critical Industry Issues

The hot topic in the building industry these days is "BIM". Everyone from designers to builders to owners is jumping on the wagon to see how this can help their business. Several current discussion topics on BIM are MEP coordination, file sharing, interoperability, and vendor product information modeling. The PACE Roundtable BIM breakout session discussed these issues and a summary of the discussion is provided. A possible application for BIM use on the Monongalia General Hospital Addition and Renovation project and an industry contact for further advice, are also discussed.

A. Detailed Project Schedule

A detailed schedule was developed for the entire project including the renovations. The full schedule can be found in Appendix A.

Zones

Construction sequencing on the project proceeds in order from one zone to the next. As one zone is complete with the activity it starts the next activity on the schedule. The next zone then begins with the previous zone's completed activity, and so on and so forth, throughout the majority of the main construction phases. There are three construction zones. The main tower is divided in half making up two of the three zones. The central plant is the third zone. This zone sequencing allows for activities and crews to work in a smaller area than if they were to work on the entire building until it was complete. This helps to relieve congestion on the site and within the building between contractors, and in turn speeds up the construction process.

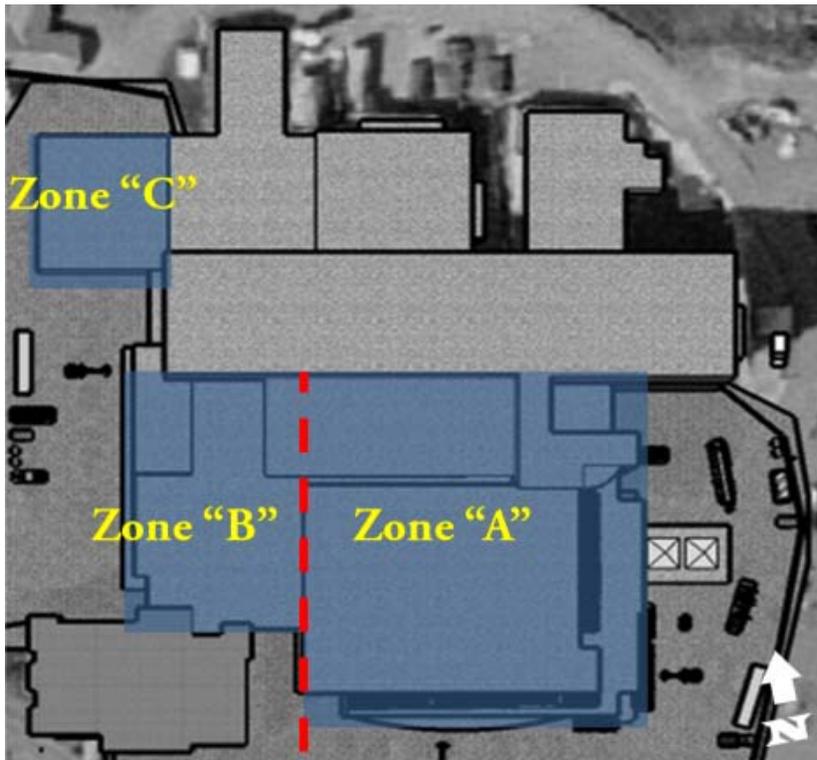


Figure A.1 – Plan view showing the construction zones

The division of the building into sequencing zones definitely aids in the factors mentioned, but the overall form and layout of the building doesn't allow for perfect sequencing. The building does not have a continuous shape or repetition in the construction of the different zones. In addition, the zones are not even equal in size (SF) and have different uses. The main zone "A" is the bulk for the tower, with the largest area and the most floors. Zone "C" is the central plant which is essentially a separate little building tied into the others. Zone "B" is the west area of the new tower. The three zones are shown in Figure A.1.

Exterior Enclosures

The exterior enclosure and façade construction is not broken up into the zones but into the four sides of the building. The sequencing progresses from the north elevation in a clockwise rotation around the exterior in three major parts with the following order: studs and Dow board, exterior masonry, and curtain wall and windows.

Renovations

After completion of the new Hazel Ruby McQuain Tower, Monongalia General Hospital moved right in and construction progressed on to the renovations inside the existing hospital building. The renovations in the existing building take place in the main tower. They consist of multiple health care departments and patient rooms from floors one to six.

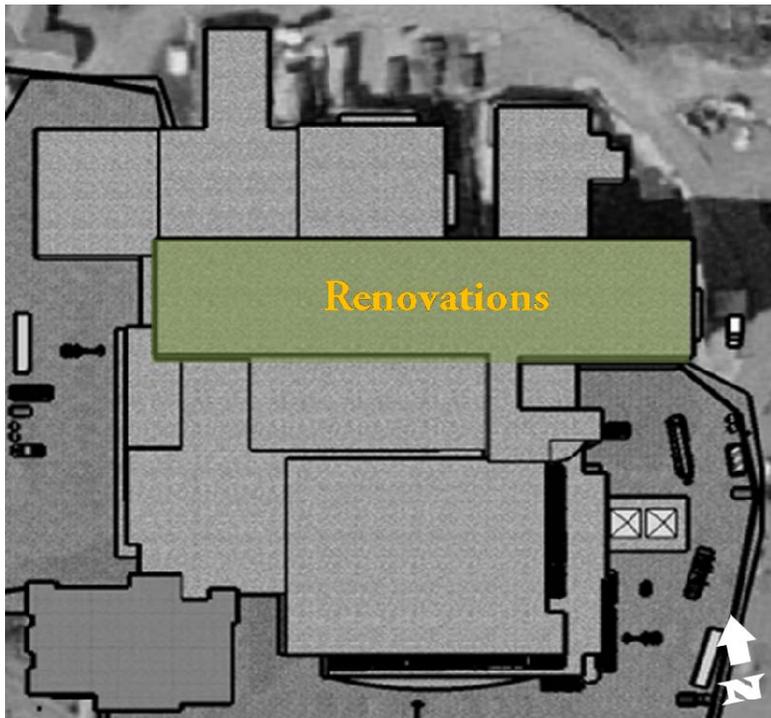


Figure A.2 – Plan view showing renovations on the existing hospital building

Additional Schedule Statistics

	MONTHS	WORK-DAYS ¹	WORK-HOURS ²
ADDITION	25	525	4,200
RENOVATIONS	15	315	2,520
TOTAL	40	840	6,720

Figure A.3 – Schedule Statistics

¹ assumes 21 workdays per month

² assumes 8 hours per day

B. Site Layout Planning

A hospital site plan requires special attention due to the sensitivity of health care providing and emergency planning. Construction activities on and around a functioning hospital have to be carefully planned to prevent interferences with the round the clock operations of the hospital. Collaboration with hospital officials is needed to arrange the construction site in such a way as to not block any of the major entrances for emergency personnel. Since a construction site is constantly changing according to the phase of the construction, a dynamic site layout according to the construction phase is often needed to cooperate with both the changing construction activities and the workings of the hospital.

The Monongalia General Hospital project is fortunately located in fairly open area. The site size does not constrict the construction zones, but rather easily provides the necessary space to construct the building without much trouble. The one area which does pose some consideration is the Health Care Center located in the southwest corner of the site. This limits access to the southwestern corner of the new tower. The southwest parking lot near the Health Care Center was left open for public parking and access to the Center. The south entrance from JD Anderson Drive, into the east parking lot, received changes to redirect traffic around the construction zone. Most of the parking lot and entrance road changes were left in place to later connect to the new tower's entrance canopy outside of the new main lobby.



Figure B.1 - Aerial photo of the existing Monongalia General Hospital

The site phase chosen to layout is the exterior enclosures and façade. The exterior façade is a red brick veneer with metal stud backing, to match the existing building. Curtain wall systems were also used often spanning two or more stories to accent the design with a more modern look. Traditional pipe scaffolding was used to construct the brick masonry façade.

The site plan of existing conditions developed in Tech Reports I is very similar to the site layout developed for the exterior enclosures and façade, and therefore is provided again as an excellent guide.

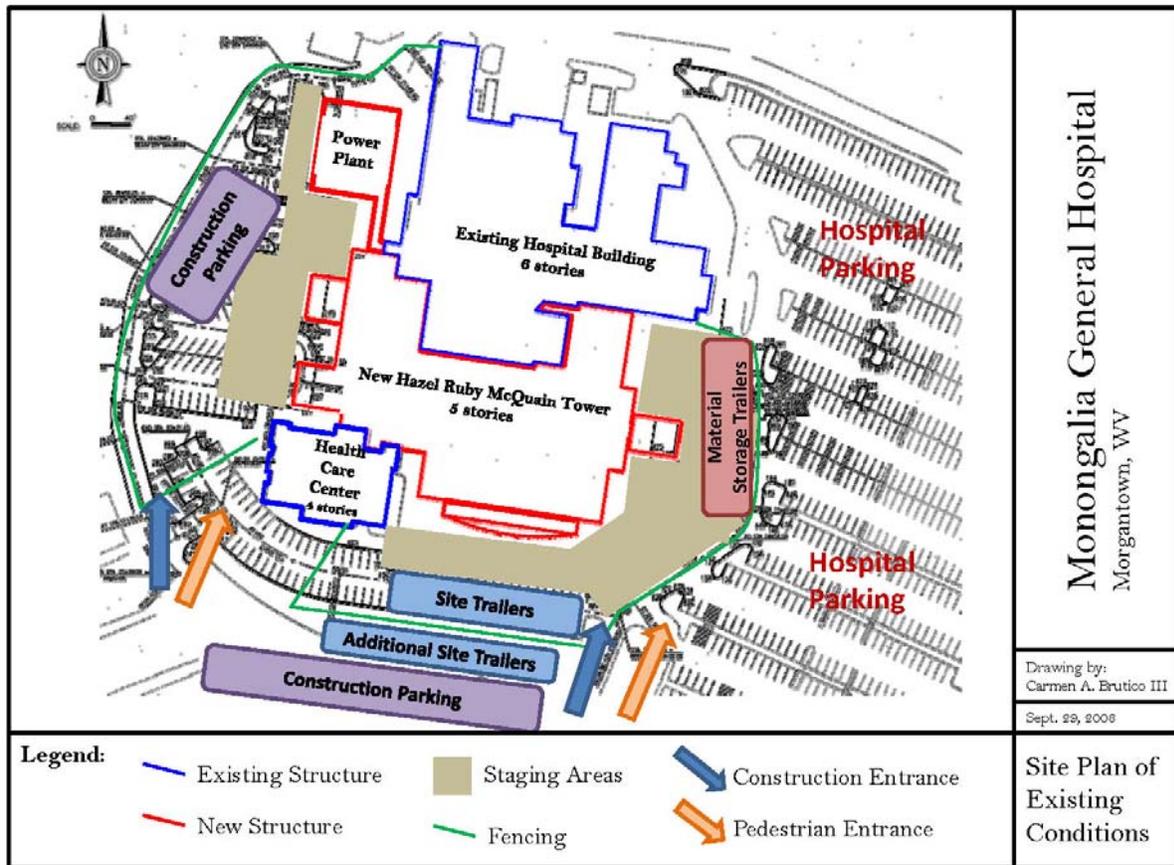


Figure B.2 – Site plan of existing conditions

Three site layout plans for the exterior enclosures and façade are located in Appendix B. Two of the three are 3-D views of the site with labeling of important site items. The third is a plan view also labeled, clearly indicating the locations of key areas and items. Additional 3-D site views are provided below to better visualize and understand the site layout.



Figure B.3 – View of Southeast corner



Figure B.4 – View from the Southeast



Figure B.5 – View from the Northeast

C. Detailed Structural Systems Estimate

The structural system for the new Hazel Ruby McQuain Tower is primarily cast in place concrete with steel rebar reinforcing. The tower rests on shallow spread footings which support typical sized 24"x24" columns. The first floor of the tower is partially underground and therefore requires a 14" cast-in-place exterior wall with #4 and #6 size rebars for horizontal and vertical reinforcing. The first floor system is a 5" thick slab-on-grade with 6x6 W.W.F. reinforcing. Floors two through six consist of an 8" thick concrete flat slab system with two-way reinforcing at the top and bottom of the slab, and drop panels at the interior columns. The common beam size is 24"x18" (width x depth), which are located on the exterior of the slabs, large penetrations, and areas of higher loads. The roof structure is the same as the floor systems which support the air handling units. The stair and elevator walls are 12" thick cast-in-place reinforced concrete and act as the structure's shear walls. In addition to the new hospital tower, the new central plant also uses cast-in-place concrete spread footings.

The placement method for the concrete is by pump truck. The concrete formwork consisted of a reusable Logik Crane Set Forming System provided by Patent Construction Systems. In the estimate provided, I used the costs associated with the closest formwork system to the actual formwork used.

Although the primary structure is concrete, steel members were used in two areas. The new drop off area in front of the main lobby uses a multitude of small wide flange steel beams to support the entrance roof. The new central plant incorporates three W10x33 columns to support the added weight of the two cooling towers on the plant's roof. The plant uses a combination of W-flange beams and K-series open web joist for the roofing system.

The structural system estimate incorporates the entire cast in place reinforced concrete structure and the structure steel members. The primary resource for the estimate costs were taken from R. S. Means 2008. Some rebar reinforcing was taken off by using a square foot approximation method by estimating the amount of rebar in one square foot of the area (floor, wall, etc.) and then multiplying by the total area. Most of the concrete quantities were personally obtained by take-offs directly from the construction documents. Two summary estimates are provided as well as a few sample quantity take-offs for referencing. Figure C.1 is the detailed estimate broken down by divisions. Figure C.2 is also the detailed estimate broken down by structure type.

The estimate total added up to be \$ 4,266,794.13. This cost is 6.6% of the total construction cost. That percentage is low primarily because the total construction cost includes the costs for the 95,000 SF of renovations. The estimated new area of occupied space in the addition is 210,000 SF, bringing the estimated structure cost to be \$20.32/SF.

- **Total Structural Estimate = \$ 4,266,794.13**
- Percentage of the Total Construction Cost = 6.6%
- Structure Cost Per Square Foot = \$ 20.32

Structural System Estimate By Division							
CSI Code	Description	Quantity	Unit	Material Cost	Labor Cost	Equipment Cost	Total Cost
03300 Concrete							
	3000 psi	1091.08	CY	101			\$ 110,199.08
	4000 psi	982.1	CY	106			\$ 104,102.60
	5000 psi	7859.81	CY	111			\$ 872,438.91
	Total						\$ 1,086,740.59
03050 Placement							
	Foundations	1091.08	CY		14.45	5.25	\$ 21,494.28
	Walls	1600.77	CY		19.75	7.20	\$ 43,140.75
	Columns	630.22	CY		23.50	8.60	\$ 20,230.06
	Elevated Slabs	5290.86	CY		13.55	4.94	\$ 97,828.00
	Beams	337.96	CY		36.00	13.50	\$ 16,729.02
	Slab on Grade	982.1	CY		16.70	6.10	\$ 22,391.88
	Total						\$ 221,813.99
03200 Reinforcing (in place)							
	Foundations	29.03	tons	890.00	655.00		\$ 44,851.35
	Walls	41.04	tons	890.00	460.00		\$ 55,404.00
	Columns	52.13	tons	935.00	915.00		\$ 96,440.50
	Elevated Slabs	1230	tons	990.00	475.00		\$ 1,801,950.00
	Beams	38.68	tons	935.00	860.00		\$ 69,430.60
	Slab on Grade	636.4	CSF	26.50	23.00		\$ 31,501.80
	Total						\$ 2,099,578.25
03110 Forming (in place)							
	Spread Foundations	3928.85	SFCA	1.20	3.27		\$ 17,561.96
	Strip Foundations	1892	SFCA	4.10	2.75		\$ 12,960.20
	Walls	39897	SFCA	0.83	4.15		\$ 198,687.06
	Columns	8508	SFCA	1.67	2.75		\$ 37,605.36
	Elevated Slabs	49689	SF	1.55	3.43		\$ 247,451.22
	Beams	10038	SFCA	0.90	4.73		\$ 56,513.94
	Slab on Grade	252	LF	0.38	2.02		\$ 604.80
	Total						\$ 571,384.54
03050 Finishing							
	Floor Slab Finishing	262395	SF		0.68		\$ 178,428.60
	Total						\$ 178,428.60
05000 Structural Steel							
	05120 Wide Flange Members		total				\$ 98,413.75
	05210 Open Web Joists		total				\$ 10,434.41
	Total						\$ 108,848.16
	TOTAL						\$ 4,266,794.13

Figure C.1 – Structural System Estimate Broken Down By Division

Structural System Estimate						
Description	Quantity	Unit	Material Cost	Labor Cost	Equipment Cost	Total Cost
Column Foundations						
3000 psi concrete	721.45	CY	101.00			\$ 72,866.45
Placement	721.45	CY		14.45	5.25	\$ 14,212.57
Steel Reinforcing (in place)	20.33	tons	890.00	655.00		\$ 31,409.85
Forming (in place)	3568.25	SFCA	1.20	3.27		\$ 15,950.08
TOTAL						\$ 134,438.94
Strip Foundations						
3000 psi concrete	243.56	CY	101.00			\$ 24,599.56
Placement	243.56	CY		14.45	5.25	\$ 4,798.13
Steel Reinforcing (in place)	4.61	tons	890.00	655.00		\$ 7,122.45
Forming (in place)	1892	SFCA	4.10	2.75		\$ 12,960.20
TOTAL						\$ 49,480.34
Spread Foundations						
3000 psi concrete	126.07	CY	101.00			\$ 12,733.07
Placement	126.07	CY		14.45	5.25	\$ 2,483.58
Steel Reinforcing (in place)	4.09	tons	890.00	655.00		\$ 6,319.05
Forming (in place)	360.6	SFCA	1.20	3.27		\$ 1,611.88
TOTAL						\$ 23,147.58
Shear Walls						
5000 psi concrete	744.33	CY	111.00			\$ 82,620.63
Placement	744.33	CY		19.75	7.20	\$ 20,059.69
Steel Reinforcing (in place)	13.42	tons	890.00	460.00		\$ 18,117.00
Forming (in place)	20097	SFCA	0.83	4.15		\$ 100,083.06
TOTAL						\$ 220,880.38
Elevated Floor Slabs						
5000 psi concrete	5290.86	CY	111.00			\$ 587,285.46
Placement	5290.86	CY		13.55	4.94	\$ 97,828.00
Steel Reinforcing (in place)	1230	tons	990.00	475.00		\$ 1,801,950.00
Forming (in place)	49689	SF	1.55	3.43		\$ 247,451.22
Slab Finishing	198755	SF		0.68		\$ 135,153.40
TOTAL						\$ 2,869,668.08
Columns						
5000 psi concrete	630.22	CY	111.00			\$ 69,954.42
Placement	630.22	CY		23.50	8.60	\$ 20,230.06
Steel Reinforcing (in place)	52.13	tons	935.00	915.00		\$ 96,440.50
Forming (in place)	8508	SFCA	1.67	2.75		\$ 37,605.36
TOTAL						\$ 224,230.34
Basement Walls						
5000 psi concrete	856.44	CY	111.00			\$ 95,064.84
Placement	856.44	CY		19.75	7.20	\$ 23,081.06
Steel Reinforcing (in place)	27.62	tons	890.00	460.00		\$ 37,287.00
Forming (in place)	19800	SFCA	0.83	4.15		\$ 98,604.00
TOTAL						\$ 254,036.90
Slab on Grade						
4000 psi concrete	982.1	CY	106.00			\$ 104,102.60
Placement	982.1	CY		16.70	6.10	\$ 22,391.88
Steel Reinforcing (in place)	636.4	CSF	26.50	23.00		\$ 31,501.80
Forming (in place)	252	LF	0.38	2.02		\$ 604.80
Slab Finishing	63640	SF		0.68		\$ 43,275.20
TOTAL						\$ 201,876.28
Beams						
5000 psi concrete	337.96	CY	111.00			\$ 37,513.56
Placement	337.96	CY		36.00	13.50	\$ 16,729.02
Steel Reinforcing (in place)	38.68	tons	935.00	860.00		\$ 69,430.60
Forming (in place)	10038	SFCA	0.90	4.73		\$ 56,513.94
TOTAL						\$ 180,187.12
Structural Steel						
Wide Flange Members		total				\$ 98,413.75
Open Web Joists		total				\$ 10,434.41
TOTAL						\$ 108,848.16
TOTAL						\$ 4,266,794.13

Figure C.2 – Structural System Estimate Broken Down By Assembly

D. General Conditions Estimate

A general conditions estimate was developed for the project. Project staffing is relative to the actual job staffing as per the staffing organizational chart provided in Tech I provided below in Figure D.1 for reference. A few additional assistance personnel located in regional offices not shown in the organizational chart were also charged to the job for the slight amount of contribution and time spent on the project. Most of the cost units were taken from R.S. Means 2007 and 2008. Examination of the project and construction site location aided in determining the necessary items to include in the estimate. The construction duration of 42 months was used to calculate the time dependent costs.

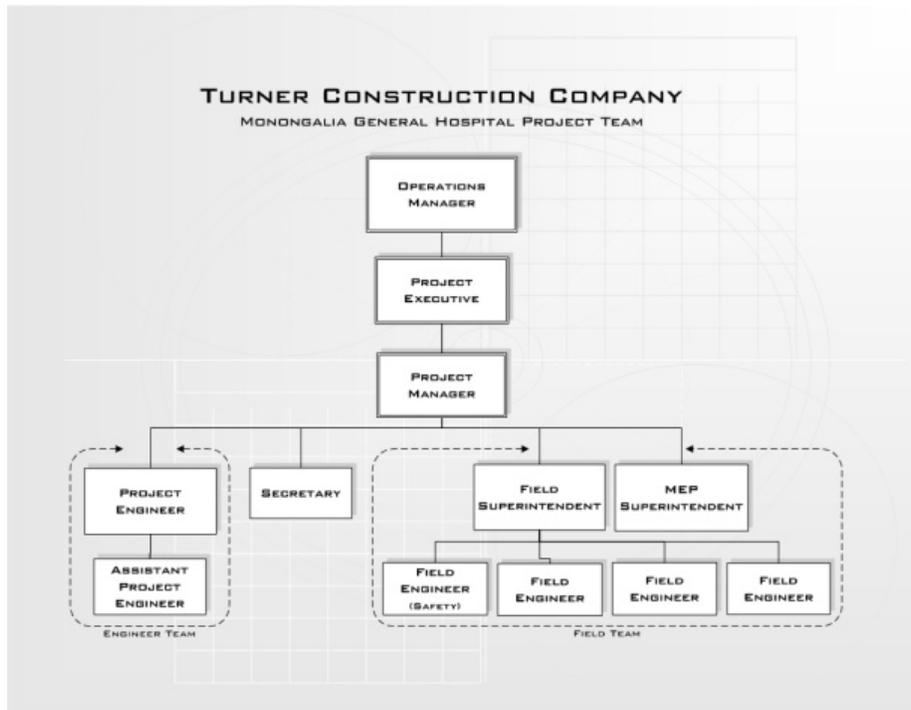


Figure D.1 – Project Staffing Organizational Chart

The staffing calculations are broken down by using main project phases in order to accurately estimate the amount of time to charge each personnel to the job. Each personnel contribute a different amount in each of the project phases. The amount designated to each phase is then weighted by the length of the phase relative to the total length of the project. Figure D.2 better demonstrates this by charting the phase lengths and percentages.

	MONTHS	% OF PROJECT TOTAL
PRE-CONSTRUCTION PHASE	6	13%
ADDITION CONSTRUCTION PHASE	24	50%
RENOVATION CONSTRUCTION PHASE	18	38%
PROJECT TOTAL	48	

Figure D.2 – Project Phase Durations

Because not all of the personnel are working exclusively on this project at a certain phase, this breakdown method is used to more easily calculate the resulting amount of time each individual will be working on the project. Figure D.3 shows the administrative personnel and their contributions on this project. These contributions and the percentages of each phase with respect to the total project duration are used to obtain the total percent the individual is working on the project. The resulting weeks for each are then calculated and used directly in the general conditions estimate.

PROJECT STAFF	% ON PRE-CON	% ON ADDITION	% ON RENOVATION	TOTAL % ON JOB	RESULTING WEEKS
PROJECT MANAGER	50	50	50	50	104
PROJECT ENGINEER	50	100	75	84.375	175.5
ASSISTANT PROJECT ENGINEER	10	100	100	88.75	184.6
FIELD SUPERINTENDENT	25	100	100	90.625	188.5
MEP SUPERINTENDENT	25	100	50	71.875	149.5
FIELD ENGINEER	50	100	100	93.75	195
FIELD ENGINEER	0	100	50	68.75	143
FIELD ENGINEER	0	100	0	50	104
FIELD/SAFETY ENGINEER	0	100	100	87.5	182
SECRETARY	0	100	100	87.5	182
ACCOUNTANT	10	25	25	23.125	48.1
COST ENGINEER	25	20	20	20.625	42.9
PURCHASING ENGINEER	100	25	25	34.375	71.5
IT TECHNICIAN	5	10	5	7.5	15.6

Figure D.3 – Project Staffing Contributions

The general conditions estimate is broken down into three parts: administration expenses, temporary facilities, and general operations. The administrative costs make up the bulk of the general conditions estimate at around 62% of the total. The total general conditions estimate totals \$6,195,079 which is approximately 9.6% of the total construction cost. The complete breakdown of the general conditions estimate is provided in Figure D.4.

- Administrative Expenses = \$ 3,862,625
- Temporary Facilities = \$ 839,752.50
- General Operations = \$ 1,492,701.85
- **Total General Conditions = \$ 6,195,079.35**

GENERAL CONDITIONS								
PROJECT: Monongalia General Hospital Addition & Renovations					LOCATION: Morgantown, WV			
OWNER: Monongalia General Hospital								
Description	Qty	Unit	Labor			Material		Total Cost
			Unit Price	Burden	Cost	Unit Price	Cost	
01300 Administrative Expense								
MANAGEMENT & SUPERVISION								
Project Manager	104	wks	\$3,375		\$351,000			\$ 351,000.00
Field Superintendent	188.5	wks	\$3,125		\$589,063			\$ 589,062.50
MEP Superintendent	149.5	wks	\$3,125		\$467,188			\$ 467,187.50
ENGINEERING & SAFETY								
Project Engineer	175.5	wks	\$3,125		\$548,438			\$ 548,437.50
Assistant Project Engineer	184.6	wks	\$2,100		\$387,660			\$ 387,660.00
Field Engineer	195	wks	\$1,800		\$351,000			\$ 351,000.00
Field Engineer	143	wks	\$1,800		\$257,400			\$ 257,400.00
Field Engineer	104	wks	\$1,375		\$143,000			\$ 143,000.00
Field/Safety Engineer	182	wks	\$1,375		\$250,250			\$ 250,250.00
OFFICE & SUPPORT								
Secretary	182	wks	\$1,125		\$204,750			\$ 204,750.00
Accountant	48.1	wks	\$1,675		\$80,568			\$ 80,567.50
Cost Engineer	42.9	wks	\$1,775		\$76,148			\$ 76,147.50
Purchasing Engineer	71.5	wks	\$1,775		\$126,913			\$ 126,912.50
IT Technician	15.6	wks	\$1,875		\$29,250			\$ 29,250.00
Administrative Expense Totals								\$ 3,862,625.00
01500 Temporary Facilities								
PROJECT UTILITIES								
Temp. Power Hookup & Dist.	3050	CSF flr	\$11.05		\$33,703	\$2.63	\$8,022	\$ 41,724.00
Temporary Lighting	3050	CSF flr/mnth	\$2.85	36 mnth	\$312,930			\$ 312,930.00
OFFICE UTILITIES								
Office Utilities	42	mo	\$165		\$6,930			\$ 6,930.00
Job Telephone/Fax	42	mo	\$88		\$3,696			\$ 3,696.00
Office Supplies	42	mo	\$94		\$3,927			\$ 3,927.00
Furniture & Equipment	42	mo	\$410		\$17,220			\$ 17,220.00
SITE EQUIPMENT & POTECTION								
Rubbish Chute	60	LF	\$23.50	x 2	\$2,820	\$44	\$5,280	\$ 8,100.00
Dumpster	182	wk		x 2		\$1,160	\$422,240	\$ 422,240.00
Fences	1950	LF	\$1.69		\$3,296	\$7.75	\$15,113	\$ 18,408.00
Signs & Barricades	225	SF				\$17.90	\$4,028	\$ 4,027.50
Fire Protection	10	each				\$55	\$550	\$ 550.00
Temporary Facilites Totals								\$ 839,752.50
01500 General Operations								
PERMITS LICENSES & TAXES								
Building Permit		job				0.10%		\$ 64,682.00
BOND INSURANCE								
Performance Bond		job	1%					\$ 646,820.00
Liability Insurance		job	1%					\$ 646,820.00
UTILITIES								
Power Bills	42	month	\$110		\$4,620			\$ 4,620.00
Water Bills	42	month	\$62		\$2,604			\$ 2,604.00
Chemical Toilet	42	month		x 8		\$80	\$26,880	\$ 26,880.00
TESTING & INSPECTION								
Inspector	20	days	\$245		\$4,900			\$ 4,900.00
Onsite Video Camera	42	months				\$565	\$23,730	\$ 23,730.00
CLEANUP								
Periodic Cleanup	305.00	MSF	\$34		\$10,370	\$4.50	\$1,373	\$ 11,742.50
Final Cleanup	305.00	MSF	\$47		\$14,335	\$6.61	\$2,016	\$ 16,351.05
Punchlist & Warranty		job	0.02%					\$ 12,936.40
Glass Cleaning	305.00	MSF	\$97		\$29,585	\$3.38	\$1,031	\$ 30,615.90
General Operations Totals								\$ 1,492,701.85
General Conditions Subtotal								\$ 6,195,079.35

Figure D.4 – General Conditions Estimate

E. Critical Industry Issues

BIM – Building Information Modeling

During the BIM breakout session each of the attendees briefly explained their experiences using BIM. The majority of the people considered themselves to be beginner to intermediate spectrum of knowledge on the subject. Most of the experiences were through MEP coordination. Throughout the discussion the mentioning of the owner's decision to push BIM use on projects has been the biggest driving factor for BIM use in the industry. That is not to say that many of the industry leaders using BIM haven't taken it upon themselves to implement some use of BIM on their projects and it seems that the companies that do this on their own have a better grasp on the technology and benefits than others.

One of the other areas of BIM in the industry which was discussed was the steel industry and their now regular implementations. Steel industry technology has aided in the fabrication of steel components by reducing errors and more easily creating shop drawings. One of the most common topics currently discussed is the file sharing capabilities, or lack thereof between BIM tools. The linkage between designer, contractor, and fabricator models has been a problem point because of the different file types the information is represented in. Different parties use different tools which are yet to be completely interoperable. A second common topic is putting the "I" in BIM. Three dimensional spatial representation models are commonly referred to as BIM. While 3-D models do add value and aid to the project, many lack the information aspect needed to truly be an information model.

An interesting topic brought up at the meeting was for product venders to begin to produce models with product information for their buyers to access. Similar to the way venders produce CAD files for their offered products often accessible via website, to provide a similar product information model which can be imported into designer's or builder's BIM. The hope is that the venders will catch on and provide this additional service to aid both the builder and themselves as a marketing tool, as industry begins to turn to BIM as standard practice. I see this as a great asset for the future of BIM. Quality vender product information in a BIM can greatly aid construction managers in procurement, material tracking, and commissioning on a project.

Although this area is still in development I feel this could be a crucial tool on the Monongalia General Hospital project. Since a hospital requires an intricate MEP system to provide quality health care to its patients, the MEP system has more parts and equipment than the average building. Material and equipment tracking from the procurement, to onsite delivery, installation, and commissioning can reduce track problems before becoming a schedule or cost burden to the project and owner.

An industry member from Truland Systems Corporation is a key contact for my area of interest on my thesis building. Truland provides electrical construction services for health care facilities, posing as a great resource for my thesis project. The contact person, Charles Tomasco, also attended the BIM breakout session and showed a lot of knowledge on the subject. He mentioned that Truland uses some sort of BIM on almost all of their projects. In speaking with him, he both seemed very enthusiastic about giving back to the Penn State Architectural Engineering program by helping out current AE students.

Appendix A: Detailed Project Schedule

ID	Task Name	Duration	Start	Finish	2006				2007				2008				2009				2010
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1
1	Phase 1 - Temporary Site Work	68 days?	Mon 4/17/06	Wed 7/19/06																	
2	Establish Construction Entrance at Loading Dock Area	5 days?	Mon 4/17/06	Fri 4/21/06																	
3	Rock Crushing Operation	10 days?	Mon 5/1/06	Fri 5/12/06																	
4	Pave East Parking Lot	15 days?	Thu 6/1/06	Wed 6/21/06																	
5	Temporary Fencing Configuration 1	5 days?	Tue 6/13/06	Mon 6/19/06																	
6	Protect Existing Facility	8 days?	Tue 6/20/06	Thu 6/29/06																	
7	Establish Temporary Loop Road	5 days?	Thu 6/22/06	Wed 6/28/06																	
8	Sequence 1 Demolition	14 days?	Fri 6/30/06	Wed 7/19/06																	
9	Phase 2 - Establish Safety Routes and Signage (by MGH)	92 days?	Mon 5/22/06	Tue 9/26/06																	
10	Establish New 2-hr Horizontal Corridor & Fire Rated Doors	10 days?	Mon 5/22/06	Fri 6/2/06																	
11	Install Temporary Construction Wall at Existing Stair Demo Location	3 days?	Mon 6/5/06	Wed 6/7/06																	
12	Remove Existing "Dead End" Corridor Wall	2 days?	Thu 6/8/06	Fri 6/9/06																	
13	Build New Wall & Change Swing of Stair Door	3 days?	Thu 6/8/06	Mon 6/12/06																	
14	Change Main Entrance to East Elevation	1 day?	Fri 6/9/06	Fri 6/9/06																	
15	Close Down Waiting Area & Gift Shop	1 day?	Fri 6/9/06	Fri 6/9/06																	
16	Install Temporary Corridor Doors	2 days?	Mon 6/12/06	Tue 6/13/06																	
17	Build Temp MRI Dock & Complete Roadwork & Parking at Central Plant	20 days?	Mon 6/19/06	Fri 7/14/06																	
18	Remove Screen Wall & Pour Temporary Sidewalk	3 days?	Fri 6/30/06	Tue 7/4/06																	
19	Sawcut Existing Sidewalk & Install Temporary Handrail	2 days?	Wed 7/5/06	Thu 7/6/06																	
20	Healthcare Building	31 days?	Tue 8/15/06	Tue 9/26/06																	
21	Install Temporary Walls for Demolition	3 days?	Tue 8/15/06	Thu 8/17/06																	
22	Demo Existing Bathroom Facilities	5 days?	Fri 8/18/06	Thu 8/24/06																	
23	Build New Main Entrance Corridor Walls	5 days?	Fri 8/25/06	Thu 8/31/06																	
24	Demo Exterior Wall for New Emergency Exit & New Main Entrance Doors	5 days?	Tue 8/29/06	Mon 9/4/06																	
25	Pour Temporary Sidewalk	3 days?	Tue 9/5/06	Thu 9/7/06																	
26	Build Covered Walkway to South Parking Lot Area	6 days?	Tue 9/19/06	Tue 9/26/06																	
27	Phase 3	25 days?	Tue 7/11/06	Mon 8/14/06																	
28	Excavate for Tunnel Extension & Central Plant	5 days?	Tue 7/11/06	Mon 7/17/06																	
29	Excavate Area "A"	10 days?	Tue 7/11/06	Mon 7/24/06																	
30	Fill Parking Lot Behind Health Care Building	10 days?	Thu 7/13/06	Wed 7/26/06																	
31	Tunnel Extension & Central Plant Foundations	20 days?	Tue 7/18/06	Mon 8/14/06																	
32	Fill New Slope On West Side	10 days?	Thu 7/27/06	Wed 8/9/06																	
33	Phase 4	22 days?	Tue 7/25/06	Wed 8/23/06																	
34	Soil Nailing Operation Area "A"	15 days?	Tue 7/25/06	Mon 8/14/06																	
35	Stone & Fine Grade Parking Lot Behind Health Care Building	10 days?	Thu 8/10/06	Wed 8/23/06																	
36	Rough Grade West Side	5 days?	Thu 8/10/06	Wed 8/16/06																	
37	Backfill Tunnel Extension & Central Plant Foundations	5 days?	Tue 8/15/06	Mon 8/21/06																	
38	Phase 5	60 days?	Tue 7/25/06	Mon 10/16/06																	
39	Foundations Area "A"	40 days?	Tue 7/25/06	Mon 9/18/06																	
40	Soil Nailing Health Care Building	10 days?	Tue 8/15/06	Mon 8/28/06																	
41	Establish Temporary Emergency Ambulance Entrance & Contractor Storage	10 days?	Thu 8/17/06	Wed 8/30/06																	
42	Central Plant Underground Piping	20 days?	Tue 8/22/06	Mon 9/18/06																	
43	Central Plant Structure	40 days?	Tue 8/22/06	Mon 10/16/06																	
44	Binder & Strip Parking Lot Behind Health Care Building	10 days?	Thu 8/24/06	Wed 9/6/06																	
45	Phase 6	140 days?	Tue 9/5/06	Mon 3/19/07																	
46	Area "A" Structure	140 days?	Tue 9/5/06	Mon 3/19/07																	
47	Open New Main Entrance & Parking Lot Behind Health Care Building	1 day?	Wed 9/27/06	Wed 9/27/06																	

Project: Detailed Schedule Date: Thu 10/23/08

Task Progress Summary External Tasks Deadline

Split Milestone External Milestone

ID	Task Name	Duration	Start	Finish	2006				2007				2008				2009				2010	
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	
48	Shut Down Existing Emergency Parking & North Entrance to Health Care Building	1 day?	Thu 9/28/06	Thu 9/28/06				I														
49	Temporary Fencing Configuration 2	5 days?	Fri 9/29/06	Thu 10/5/06				I														
50	Sequence 2 Demolition (Emergency & Health Care Canopies)	5 days?	Fri 10/6/06	Thu 10/12/06				I														
51	Excavate Area "B"	10 days?	Fri 10/13/06	Thu 10/26/06				I														
52	Extend Existing Storm & Sanitary	10 days?	Fri 10/27/06	Thu 11/9/06				I														
53	15kV Ductbank & Re-Engergize Health Care Facility	15 days?	Fri 11/10/06	Thu 11/30/06				I														
54	Install Retaining Wall West of Health Care Building	10 days?	Fri 12/1/06	Thu 12/14/06				I														
55	Phase 7	122 days?	Fri 10/27/06	Mon 4/16/07				I														
56	Soil Nailing Area "B"	15 days?	Fri 10/27/06	Thu 11/16/06				I														
57	Central Plant Piping & Equipment Installation	100 days?	Tue 11/28/06	Mon 4/16/07				I														
58	Phase 8	147 days?	Fri 11/17/06	Mon 6/11/07				I														
59	Foundations Area "B"	20 days?	Fri 11/17/06	Thu 12/14/06				I														
60	Central Plant Interior Work & Punch	40 days?	Tue 4/17/07	Mon 6/11/07																		
61	Phase 9	216 days?	Fri 12/15/06	Fri 10/12/07				I														
62	Area "B" Structure	90 days?	Fri 12/15/06	Thu 4/19/07				I														
63	Roofing Area "A"	135 days?	Mon 4/9/07	Fri 10/12/07																		
64	Phase 10	255 days?	Mon 1/22/07	Fri 1/11/08																		
65	Exterior Envelope	255 days?	Mon 1/22/07	Fri 1/11/08																		
66	Exterior Studs & Dow Board	115 days?	Mon 1/22/07	Fri 6/29/07																		
67	North Elevation	15 days?	Mon 1/22/07	Fri 2/9/07																		
68	East Elevation	20 days?	Mon 2/12/07	Fri 3/9/07																		
69	South Elevation	20 days?	Mon 3/12/07	Fri 4/6/07																		
70	West Elevation	20 days?	Mon 6/4/07	Fri 6/29/07																		
71	Exterior Masonry	170 days?	Mon 3/5/07	Fri 10/26/07																		
72	North Elevation	40 days?	Mon 3/5/07	Fri 4/27/07																		
73	East Elevation	45 days?	Mon 4/30/07	Fri 6/29/07																		
74	South Elevation	30 days?	Mon 7/2/07	Fri 8/10/07																		
75	West Elevation	55 days?	Mon 8/13/07	Fri 10/26/07																		
76	Exterior Curtain Walls and Windows	155 days?	Mon 6/11/07	Fri 1/11/08																		
77	North Elevation	15 days?	Mon 6/11/07	Fri 6/29/07																		
78	East Elevation	40 days?	Mon 7/2/07	Fri 8/24/07																		
79	South Elevation	60 days?	Mon 8/27/07	Fri 11/16/07																		
80	West Elevation	40 days?	Mon 11/19/07	Fri 1/11/08																		
81	Phase 11	143 days?	Mon 4/30/07	Wed 11/14/07																		
82	Area "A" MEP	85 days?	Mon 4/30/07	Fri 8/24/07																		
83	Roofing Area "B"	58 days?	Mon 8/27/07	Wed 11/14/07																		
84	Phase 12	75 days?	Mon 8/13/07	Fri 11/23/07																		
85	Area "B" MEP	75 days?	Mon 8/13/07	Fri 11/23/07																		
86	Area "A" Interior	45 days?	Mon 9/24/07	Fri 11/23/07																		
87	Phase 13	45 days?	Mon 11/26/07	Fri 1/25/08																		
88	Area "B" Interior	45 days?	Mon 11/26/07	Fri 1/25/08																		
89	Phase 14	65 days?	Mon 1/7/08	Fri 4/4/08																		
90	MEP Devices and Fixtures	45 days?	Mon 1/7/08	Fri 3/7/08																		
91	MEP Systems Check, Start-up, and Testing	55 days?	Mon 1/21/08	Fri 4/4/08																		
92	Owner Furnish and Install Equipment	45 days?	Mon 1/28/08	Fri 3/28/08																		
93	Phase 15	45 days?	Mon 3/17/08	Fri 5/16/08																		
94	Punchlist	30 days?	Mon 3/17/08	Fri 4/25/08																		

Project: Detailed Schedule Date: Thu 10/23/08

Task Progress Summary External Tasks Deadline

Split Milestone Project Summary External Milestone

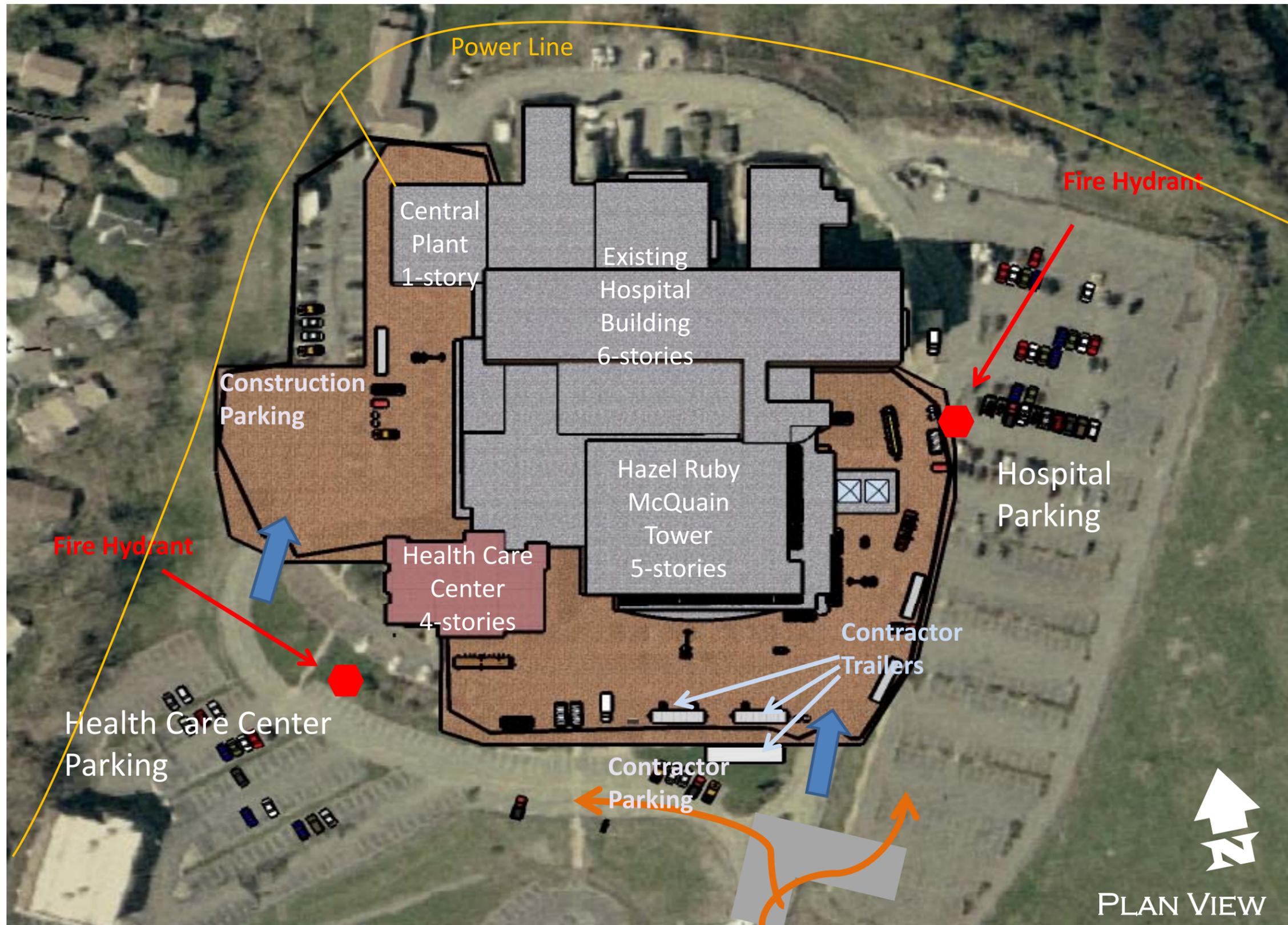
ID	Task Name	Duration	Start	Finish	2006				2007				2008				2009				2010
					Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1
95	Final Cleaning	30 days?	Mon 3/24/08	Fri 5/2/08																	
96	Turn Over New Addition	20 days?	Mon 4/21/08	Fri 5/16/08																	
97	Phase 16	59 days?	Tue 4/22/08	Sat 7/12/08																	
98	Owner Move In	40 days?	Tue 4/22/08	Mon 6/16/08																	
99	Addition Complete	1 day?	Fri 5/30/08	Fri 5/30/08																	
100	Dedication Ceremony & Open House	1 day?	Fri 7/11/08	Sat 7/12/08																	
101	Phase 17	50 days?	Mon 2/11/08	Fri 4/18/08																	
102	Relocate All Construction Equipment Over to Staging Area Behind Hospital	15 days?	Mon 2/11/08	Fri 2/29/08																	
103	Pave Roadwork & Perking for Main Addition & Main Entrance	20 days?	Mon 3/3/08	Fri 3/28/08																	
104	Move Hospital Traffic Over to New Roadway	1 day?	Fri 3/28/08	Fri 3/28/08																	
105	Pave Parking Lot at New Emergency Drop Off	10 days?	Mon 3/31/08	Fri 4/11/08																	
106	Complete Islands on West & Patch Asphalt	15 days?	Mon 3/31/08	Fri 4/18/08																	
107	Phase 18 - Renovations	325 days?	Mon 7/21/08	Fri 10/16/09																	
108	Sixth Floor	216 days?	Wed 8/6/08	Wed 6/3/09																	
109	MGH Move Out & Abatement	18 days?	Wed 8/6/08	Fri 8/29/08																	
110	Demo	20 days?	Mon 9/1/08	Fri 9/26/08																	
111	Interiors	178 days?	Mon 9/29/08	Wed 6/3/09																	
112	Mechanical Systems	163 days?	Mon 9/29/08	Wed 5/13/09																	
113	Testing & Inspections	10 days?	Thu 5/14/09	Wed 5/27/09																	
114	Punchlist	15 days?	Thu 5/14/09	Wed 6/3/09																	
115	Fifth Floor	119 days?	Fri 8/29/08	Wed 2/11/09																	
116	MGH Move Out & Abatement	11 days?	Fri 8/29/08	Fri 9/12/08																	
117	Demo	20 days?	Mon 9/15/08	Fri 10/10/08																	
118	Interiors	88 days?	Mon 10/13/08	Wed 2/11/09																	
119	Mechanical Systems	78 days?	Mon 10/13/08	Wed 1/28/09																	
120	Testing & Inspections	5 days?	Thu 1/29/09	Wed 2/4/09																	
121	Punchlist	10 days?	Thu 1/29/09	Wed 2/11/09																	
122	Fourth Floor	265 days?	Mon 10/13/08	Fri 10/16/09																	
123	Rough-in Demo	30 days?	Mon 10/13/08	Fri 11/21/08																	
124	East	82 days?	Thu 2/12/09	Fri 6/5/09																	
125	MGH Move Out & Abatement	6 days?	Thu 2/12/09	Thu 2/19/09																	
126	Demo	15 days?	Fri 2/20/09	Thu 3/12/09																	
127	Interiors	61 days?	Fri 3/13/09	Fri 6/5/09																	
128	Mechanical Systems	61 days?	Fri 3/13/09	Fri 6/5/09																	
129	West	82 days?	Thu 6/4/09	Fri 9/25/09																	
130	MGH Move Out & Abatement	6 days?	Thu 6/4/09	Thu 6/11/09																	
131	Demo	15 days?	Fri 6/12/09	Thu 7/2/09																	
132	Interiors	61 days?	Fri 7/3/09	Fri 9/25/09																	
133	Mechanical Systems	61 days?	Fri 7/3/09	Fri 9/25/09																	
134	Testing & Inspections	10 days?	Mon 9/28/09	Fri 10/9/09																	
135	Punchlist	15 days?	Mon 9/28/09	Fri 10/16/09																	
136	Third Floor	44 days?	Wed 8/13/08	Mon 10/13/08																	
137	MGH Move Out & Abatement	4 days?	Wed 8/13/08	Mon 8/18/08																	
138	Demo	10 days?	Mon 8/18/08	Fri 8/29/08																	
139	Interiors	33 days?	Mon 8/25/08	Wed 10/8/08																	
140	Mechanical Systems	35 days?	Mon 8/25/08	Fri 10/10/08																	
141	Testing & Inspections	16 days?	Mon 9/22/08	Mon 10/13/08																	

Project: Detailed Schedule Date: Thu 10/23/08

Task Progress Summary External Tasks Deadline

Split Milestone Project Summary External Milestone

Appendix B: Site Layout Plan



Monongalia General
Hospital
Morgantown, WV



Drawing by:
Carmen A. Brutico III

Oct. 24, 2008

Construction
Site Plan:
Exterior
Enclosures

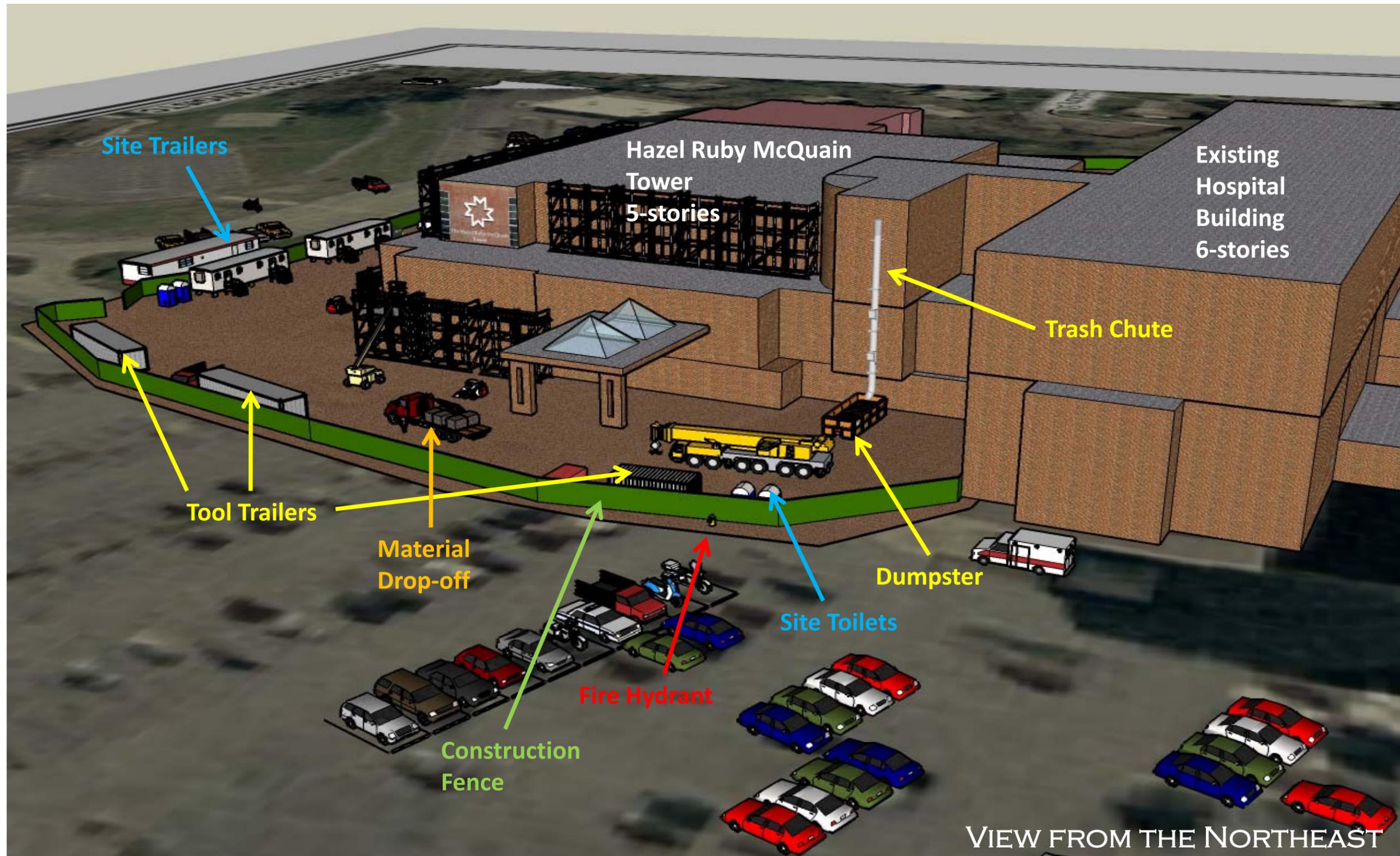
Legend:



CONSTRUCTION ENTRANCE



PUBLIC ENTRANCE



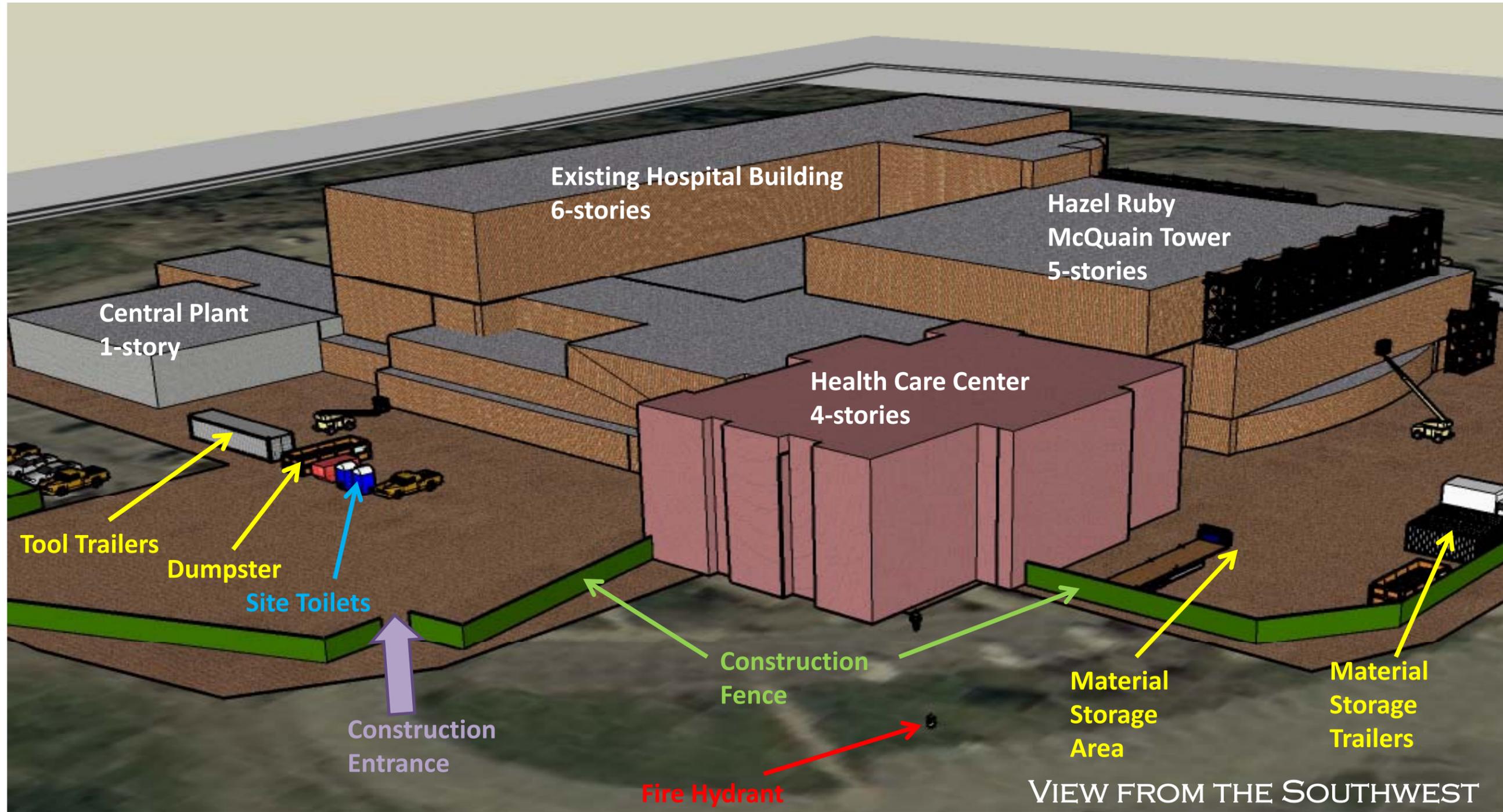
Monongalia General
Hospital
Morgantown, WV



Drawing by:
Carmen A. Brutico III

Oct. 24, 2008

Construction
Site Plan:
Exterior
Enclosures



Monongalia General
Hospital
Morgantown, WV



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Oct. 24, 2008

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