Lancaster General Hospital
Lancaster, PA

5th & 6th Floor Fit-Out
Cardiac Elevator

PRIMARY PROJECT TEAM:
Owner: Lancaster General Hospital, www.lha.com
General Contractor: Benchmark Construction Company Inc., www.benchmarkgc.com
5th and 6th Floor Fit-Out:
Architect: RTKL Associates Inc., www.rtkl.com
MEP Engineering: Barton Associates, Inc. www.ba-inc.com
Cardiac Elevator:
Architect: IKM Inc.
Structural Engineering: Atlantic Engineering Services

PROJECT FEATURES:
Total Cost - GMP $11,719,050.00
Project Delivery method: Design-Bid-Build, GC
Occupancy or Function Type: Medical/Hospital
Square Feet – 50,192
Number of Stories Above Grade - 9

CONSTRUCTION:
5th & 6th Floor: Fit-Out of existing shell space
Cardiac Elevator: Steel and cast-in-place construction of new elevated elevator shaft
Tie-in to existing corridors

STRUCTURAL:
5th & 6th Floor: Existing Steel: cast-in-place slab-on-deck to remain
Cardiac Elevator: New Steel: cast-in-place slab-on-deck

MECHANICAL, LIGHTING & ELECTRICAL:
3 AHU's totaling 41,060 CFM,9400 CFM O.A.
Med. Gas/vacuum piping
Plumbing and sanitary piping
Elec. 4-480v 75KVA transformers serving 8-120/208V panels Normal Branch
3-480V 75KVA transformers serving 6-120/208V panels Critical Branch
2-480V 15KVA transformers serving 2-120/208V panels Life Safety Branch

Devin Learn
Construction Management
Dr. Messner
Lancaster General Hospital 5th & 6th Floor Fit-Out, Cardiac Elevator
Lancaster, Pennsylvania
10/5/06
Existing Construction Conditions

A. Executive Summary

Lancaster General Hospital is located at 555 North Duke Street Lancaster, Pennsylvania and serves the Lancaster region with advanced medical care. The current project under review in this research assignment is the 5th and 6th floor fit-out including the cardiac elevator addition that will serve the nero-trauma intensive care unit on the 5th floor and the intensive care unit on the 6th floor. Existing shell space of 44,600 square feet will be fit-out to better serve the hospital in its current period of growth.

Technical assignment 1 takes a brief look at some of the key aspects of the project that will be studied in more detail throughout the research process. These aspects of the project include a site plan of existing conditions, local conditions, client information, project delivery system and staffing plan. The brief look at each of these points is not meant to be an in-depth analysis but will rather give a general view so that a better understanding of future research can be obtained. All information contained in this assignment is an interpretation of Devin Learn and any mistakes or omissions are no direct result of the project team or owner error.

B. Project Schedule Summary

The schedule showing milestone tasks can be found under ***Appendix A.*** Since the major aspects of this project including the 5th and 6th floor fit-out do not include any foundation or structural work the majority of the work outlined in the schedule are system installation and finish sequences. Both floors start at the same time with floor layout and electrical rough in above ceiling. They continue through with similar sequencing from MEP to finishes with the 6th floor finishing almost a month after the 5th floor due to nearly double the square footage. Key aspects of both fit-outs are the inspection schedules that must be set up with the Department of Health to ensure that all work is being completed to national standard. Any delay in these inspections can drastically affect the overall schedule of the project. HVAC testing and balancing is also very important because there are air flow and outside air requirements for licensure of the space for hospital use. Connecting the corridors to the space needs to be coordinated such that

C. Building Systems Summary

Yes	No	Work Scope	If yes, address these questions / issues
	X	Demolition Required?	Types of materials, lead paint, or asbestos?
X		Structural Steel Frame	Type of bracing, composite slab?, Crane size / type / location
X		Cast in Place Concrete	Horiz. And Vert. formwork types, Concrete placement methods
	X	Pre-cast Concrete	Casting location, connection methods, Crane size / type / location
X		Mechanical System	Mech. Room locations, system type, Types of distribution systems, types of Fire suppression
X		Electrical System	Size/ capacity/ redundancy

X		Masonry	Load bearing or veneer, connection details, scaffolding
	X	Curtain Wall	Materials included, construction methods, Design responsibility
	X	Support of Excavation	Types of excavation support system, Dewatering system, permanent vs. temporary

Structural Steel Frame:

All structural steel frames shall be securely braced until all floor slabs, roof decks and shear walls have been installed and become capable of stabilizing the frames. Bracing used is steel angle welded to columns and floor beams. Composite metal decking shall be used for all elevated floor slabs. A tower crane will be utilized for all steel erection. Crane will be located between the two elevated walkways directly adjacent to the elevator shaft. Crane swing is above helicopter pad for the hospital and will have to be shut down and boom swung out of the way whenever use of the pad is required. Coordination for this is done through radio contact with the hospital and Lancaster County Communications.

Cast in Place Concrete:

Cast-in-place concrete will be placed on composite metal decking in the cardiac elevator project. No formwork is required due to the metal decking. Edge stops will be permanently placed continuous bent plates 3/8”x4”x5-1/2” welded to the top of the steel floor beam with a ¼ 3@12 fillet weld. Concrete slab on deck will be 4” in depth light weight 4000psi (110 PCF Maximum). Other concrete to be used for foundation will be

placed in footing excavation requiring no other formwork. This concrete shall be 3000psi normal weight concrete.

Mechanical System:

Mechanical rooms are located on the 4th and 5th floor of the hospital directly outside the shell space on the 5th floor with the 4th floor mechanical room located directly underneath. Air handling units are forced air systems with distribution through ductwork utilizing smoke and fire dampers wherever a fire or smoke rated wall is penetrated. All areas of the hospital are fully sprinkled and the sprinkler system in the shell space are existing however drops will have to be added and main lines relocated to match floor plan layout. Sprinklers for the new elevator lobbies will be run by tapping into the main branch lines running down the corridor being tied into.

Electrical System:

Electrical service comes from 4-480V 75KVA transformers serving 8-120/208V panel's normal branch. 3-480V 75KVA transformers serving 6-120/208V panel's critical branch and 2-480V 15KVA transformers serving 2-120/208V panel's life safety branch. Also the floors are supplied with nurse call systems, alarm systems and emergency lock down systems.

Masonry:

Masonry system will be a brick veneer located on the 3 exposed sides of the elevator shaft. Adjustable masonry ties to be attached to 6"

metal stud wall. Construction scaffolding will be used adding sections as required.

D. Project Cost Evaluation

Since this project takes place inside an existing building the construction costs are the same as the total project costs with no land costs, site work, or permitting included. However the project is broken into two separate parts with the cost of the fit-out and cardiac elevator being separate. The construction costs for the 5th and 6th floor fit-out is $9,720,080.00 for 48,592 square feet leading to a cost per square foot of $200.03. The construction costs for the cardiac elevator addition being $1,998,970.00 for 1,600 square feet leading to a cost per square foot of $1,249.36.

A parametric estimate was produced for this project using ***D4Cost 2002*** estimating software. This takes into account similar projects that have been constructed in recent years in different areas of the country. This is done to produce a rough estimate that can then be altered by using current construction cost data.

The first cost comparison:

Estimate of Probable Cost
LGH 5th & 6th - Aug 2006 - PA - Lancaster

Prepared By :
Prepared By Firm : John Deklewa & Sons Inc.
Prepared By Street : 1273 Washington Pike/ PO Box 158
Prepared By Address : Bridgeville, PA 15017
Building Sq. Size : 44000
Site Sq. Size : 740520
Bid Date : 2/20/2002
Project Height : 28
1st Floor Size : 28500

1st Floor Height : 14
No. Of Buildings : 1
No. Of Floors : 2
Project Type : TBO
Building Use : Medical
Exterior Walls : N/A
Interior Walls : GYP
Foundation : N/A
Roof Type : N/A
Floor Type : CAR

Building Costs

Code	Division Name	%	Sq. Cost	Projected
01	General Requirements	11.14	7.83	344,697
	General Requirements	11.14	7.83	344,697
06	Wood, Plastics, and Composites	9.90	6.96	306,398
	Wood & Plastics	9.90	6.96	306,398
08	Openings	6.81	4.79	210,648
	Doors & Windows	6.81	4.79	210,648
09	Finishes	25.37	17.84	785,144
	Finishes	25.37	17.84	785,144
10	Specialties	0.76	0.54	23,554
	Specialties	0.76	0.54	23,554
21	Fire Suppression	0.87	0.61	26,810
	Fire Protection	0.87	0.61	26,810
22	Plumbing	13.61	9.57	421,297
	Plumbing	13.61	9.57	421,297
23	HVAC	17.32	12.19	536,196
	HVAC	17.32	12.19	536,196
26	Electrical	14.23	10.01	440,447
	Electrical	14.23	10.01	440,447
	Total Building Costs	100.00	70.35	3,095,192

Site Costs

Code	Division Name	%	Sq. Cost	Projected

Total Site Costs	100.00	0.00	0
Total Project Costs	**3,095,192**		

Building Division Notes

Site Division Notes

Project Notes

Estimate Based On Case: MD031123 - Fitness & Wellness (Build-Out)
Location: PA - Other
Date: Sep 2002
Building Size: 33,000

Estimate Based On Case: MD031122E4 - Medical Offices (Build-Out)
Location: PA - Other
Date: Dec 2002
Building Size: 28,500

* Bethel Park, Pennsylvania
** Construction Period: Dec 2002 to Mar 2003

The second cost comparison:

Estimate of Probable Cost

LGH - Aug 2006 - PA - Lancaster

Prepared By :
Prepared By Firm : Design Group Inc.
Prepared By Street : 7600 Olentangy River Road
Prepared By Address : Columbus, OH 43235
Building Sq. Size : 44000
Site Sq. Size : 392040
Bid Date : 5/28/1998
Project Height : 43
1st Floor Size : 27916
1st Floor Height : 12.8
No. Of Buildings : 1

No. Of Floors : 3
Project Type : NEW
Building Use : Medical
Exterior Walls : EIF
Interior Walls : GYP
Foundation : CON
Roof Type : MEM
Floor Type : CAR

Building Costs

Code	Division Name	%	Sq. Cost	Projected
00	Bidding Requirements	5.68	9.57	420,926
	Construction Manager Fee	3.40	5.72	251,873
	General Conditions	2.28	3.84	169,053
01	General Requirements	4.84	8.15	358,436
	Project Administration	4.59	7.73	340,202
	Testing	0.25	0.41	18,234
03	Concrete	5.14	8.66	381,206
	Concrete	5.14	8.66	381,206
04	Masonry	3.00	5.05	221,986
	Masonry	3.00	5.05	221,986
05	Metals	4.89	8.23	362,078
	Structural Steel, Joists, Deck, Mis	4.89	8.23	362,078
06	Wood & Plastics	11.91	20.07	882,902
	Millwork & Finish Carpentry	5.95	10.02	440,758
	Rough Carpentry	5.09	8.57	377,139
	Trusses	0.88	1.48	65,004
07	Thermal & Moisture Protection	7.35	12.38	544,789
	EIFS	4.38	7.37	324,488
	Fireproofing	0.34	0.57	24,948
	Firestopping	0.50	0.83	36,730
	Joint Sealers	0.23	0.38	16,894
	Roofing	1.91	3.22	141,729
08	Doors & Windows	3.98	6.71	295,174
	Entrances & Storefronts	1.63	2.75	120,900
	Hardware	1.98	3.34	146,919
	Wood Windows	0.37	0.62	27,355
09	Finishes	13.31	22.42	986,448
	Drywall, Studs & Insulation	9.21	15.52	682,909
	Flooring	2.40	4.04	177,686
	Painting	1.70	2.86	125,853
10	Specialties	1.69	2.85	125,587
	Accessories	1.49	2.50	110,190

	Louvers	0.21	0.35	15,397
11	Equipment	0.00	0.00	0
12	Furnishings	0.00	0.00	0
13	Special Construction	0.00	0.00	0
14	Conveying Systems	0.71	1.19	52,556
	Elevator	0.71	1.19	52,556
15	Mechanical	21.96	36.99	1,627,539
	Airhandlers, Chiller	13.34	22.46	988,300
	Fire Protection	1.68	2.84	124,814
	Plumbing	6.94	11.69	514,425
16	Electrical	15.54	26.17	1,151,582
	Electrical	15.54	26.17	1,151,582
	Total Building Costs	100.00	168.44	7,411,209

Site Costs

Code	Division Name	%	Sq. Cost	Projected
02	Site Work	100.00	2.28	895,564
	Drainage	14.29	0.33	127,933
	Electric	12.19	0.28	109,134
	Excavation	37.30	0.85	334,079
	Fencing	3.40	0.08	30,433
	Landscaping	11.90	0.27	106,604
	Paving	17.41	0.40	155,896
	Plumbing	3.52	0.08	31,486
	Total Site Costs	100.00	228.44	895,564
	Total Project Costs			**8,306,774**

Project Notes

Estimate Based On Case: MD010123 - Greene Memorial Hospital
Location: OH - Other
Date: May 1998
Building Size: 45,075

*Beavercreek, Ohio
*Construction Period Jul 98 to Apr 99

The next form of cost comparison comes in the form a square foot estimate for the project using R.S. Means data. Since the only square foot cost data that was available was for new construction there are several changes that will need to be made. These include subtracting the site work and building structural systems from the square foot cost data. This research includes square foot estimates for both 2-3 story hospitals as well as 4-8 story hospitals to get a broader representation of possible costs.

When taking into consideration that these projects and square foot cost estimates include structural and building envelope costs they seem to be on the low end of both project cost and square foot cost values. When subtracting the structural and shell costs for the 2-3 story hospital the cost per square foot comes to $109.40 and for the 4-8 story hospital cost per square foot comes to $93.03. After applying the location factor for Lancaster, PA of .93 these values fall even lower to $101.74 and $86.77 respectively with an average of $94.25. Compared to the actual square foot value of $200.03/sf these values only account for less than half of the square foot cost. The difference in these costs is attributed to the very high technology and high finish quality requirements. As well as the increased cost of building materials such as copper for example that have increased drastically since these project cost values and square foot cost data was compiled.

Model costs calculated for a 3 story building with 12' story height and 55,000 square feet of floor area

Hospital, 2-3 Story

				Unit	Unit Cost	Cost Per S.F.	% Of Sub-Total
A. SUBSTRUCTURE							
1010	Standard Foundations	Poured concrete; strip and spread footings		S.F. Ground	3.72	1.24	3.0%
1030	Slab on Grade	4" reinforced concrete with vapor barrier and granular base		S.F. Slab	3.42	1.14	
2010	Basement Excavation	Site preparation for slab and trench for foundation wall and footing		S.F. Ground	1.09	.36	
2020	Basement Walls	4' foundation wall		L.F. Wall	52	54	
B. SHELL							
	B10 Superstructure						
1010	Floor Construction	Cast-in-place concrete beam and slab		S.F. Floor	15.94	10.63	13.6%
1020	Roof Construction	Cast-in-place concrete beam and slab		S.F. Roof	13.14	4.38	
	B20 Exterior Enclosure						
2010	Exterior Walls	Face brick and structural facing tile	85% of wall	S.F. Wall	29	9.23	9.6%
2020	Exterior Windows	Aluminum sliding	15% of wall	Each	509	1.23	
2030	Exterior Doors	Double aluminum and glass and sliding doors		Each	1878	20	
	B30 Roofing						
3010	Roof Coverings	Built-up tar and gravel with flashing, perlite/EPS composite insulation		S.F. Roof	3.87	1.29	1.2%
3020	Roof Openings	Roof hatches		S.F. Roof	.03	.01	
C. INTERIORS							
1010	Partitions	Concrete block, gypsum board on metal studs	9 S.F. Floor/L.F. Partition	S.F. Partition	4.45	4.94	26.4%
1020	Interior Doors	Single leaf hollow metal	90 S.F. Floor/Door	Each	.537	5.97	
1030	Fittings	Hospital Curtains		S.F. Floor	.69	.69	
2010	Stair Construction	Concrete filled metal pan		Flight	4225	7.69	
3010	Wall Finishes	40% vinyl wall covering, 35% ceramic tile, 25% epoxy coating		S.F. Surface	5.42	6.02	
3020	Floor Finishes	60% vinyl tile, 20% ceramic, 20% terrazzo		S.F. Floor	6.83	6.83	
3030	Ceiling Finishes	Plaster on suspended metal lath		S.F. Ceiling	3.71	3.71	
D. SERVICES							
	D10 Conveying						
1010	Elevators & Lifts	Two hydraulic hospital elevators		Each	75,900	2.76	2.5%
1020	Escalators & Moving Walks	N/A		—	—	—	
	D20 Plumbing						
2010	Plumbing Fixtures	Kitchen, toilet and service fixtures, supply and drainage	1 Fixture/265 S.F. Floor	Each	3339	12.60	15.2%
2020	Domestic Water Distribution	Electric water heater		S.F. Floor	3.93	3.93	
2040	Rain Water Drainage	Roof drains		S.F. Roof	.81	.27	
	D30 HVAC						
3010	Energy Supply	Oil fired hot water, wall fin radiation		S.F. Floor	3.06	3.06	11.0%
3020	Heat Generating Systems	N/A		—	—	—	
3030	Cooling Generating Systems	Chilled water, fan coil units		S.F. Floor	9.15	9.15	
3050	Terminal & Package Units	N/A		—	—	—	
3090	Other HVAC Sys. & Equipment	N/A		—	—	—	
	D40 Fire Protection						
4010	Sprinklers	Wet pipe sprinkler system		S.F. Floor	1.56	1.56	1.4%
4020	Standpipes	N/A		—	—	—	
	D50 Electrical						
5010	Electrical Service/Distribution	1200 ampere service, panel board and feeders		S.F. Floor	1.12	1.12	10.8%
5020	Lighting & Branch Wiring	Fluorescent fixtures, receptacles, switches, A.C. and misc. power		S.F. Floor	8.32	8.32	
5030	Communications & Security	Alarm systems, communications systems, emergency lighting, emergency generator		S.F. Floor	1.67	1.67	
5090	Other Electrical Systems	Emergency generator 125 kW		S.F. Floor	.92	.92	
E. EQUIPMENT & FURNISHINGS							
1010	Commercial Equipment	N/A		—	—	—	4.8%
1020	Institutional Equipment	Oxygen piping, curtain partitions		S.F. Floor	.72	.72	
1030	Vehicular Equipment	N/A		—	—	—	
1090	Other Equipment	Patient wall systems		S.F. Floor	4.57	4.57	
F. SPECIAL CONSTRUCTION & DEMOLITION							
1020	Integrated Construction	Conductive flooring		S.F. Floor	.54	.54	0.5%
1040	Special Facilities	N/A		—	—	—	
G. BUILDING SITEWORK		**N/A**					
					Sub-Total	110.60	**100%**
	CONTRACTOR FEES (General Requirements: 10%, Overhead: 5%, Profit: 10%)				25%	27.65	
	ARCHITECT FEES				9%	12.45	
					Total Building Cost	**150.70**	

Model costs calculated for a 6 story building with 12' story height and 200,000 square feet of floor area

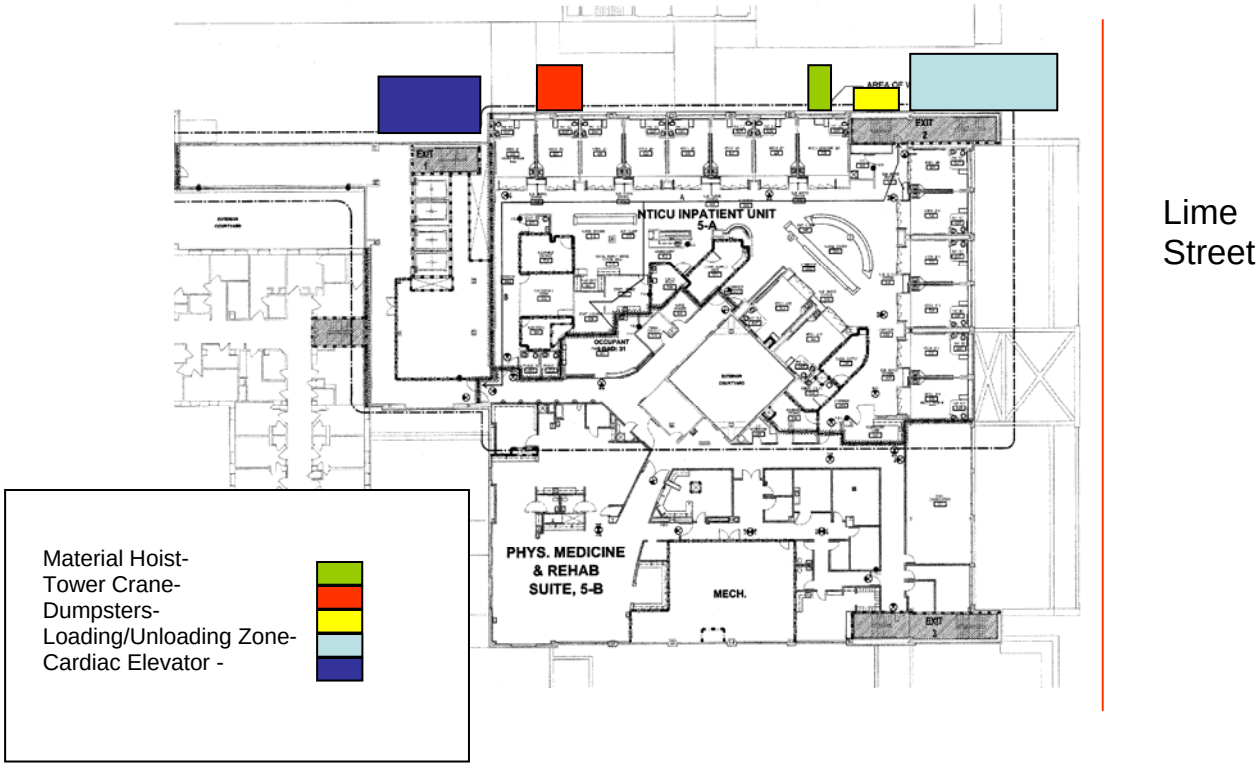
Hospital, 4-8 Story

				Unit	Unit Cost	Cost Per S.F.	% Of Sub-Total
A SUBSTRUCTURE							
1010	Standard Foundations	Poured concrete, strip and spread footings		S.F. Ground	3.66	.61	1.8%
1030	Slab on Grade	4" reinforced concrete with vapor barrier and granular base		S.F. Slab	3.42	.57	
2010	Basement Excavation	Site preparation for slab and trench for foundation wall and footing		S.F. Ground	1.09	.18	
2020	Basement Walls	4' foundation wall		L.F. Wall	52	23	
B SHELL							
	B10 Superstructure						
1010	Floor Construction	Concrete slab with metal deck and beams, steel columns		S.F. Floor	12.23	10.19	12.1%
1020	Roof Construction	Metal deck, open web steel joists, beams, interior columns		S.F. Roof	4.92	.82	
	B20 Exterior Enclosure						
2010	Exterior Walls	Face brick and structural facing tile	70% of wall	S.F. Wall	29	6.39	10.2%
2020	Exterior Windows	Aluminum sliding	30% of wall	Each	396	2.47	
2030	Exterior Doors	Double aluminum and glass and sliding doors		Each	3091	.43	
	B30 Roofing						
3010	Roof Coverings	Built-up tar and gravel with flashing; perlite/EPS composite insulation		S.F. Roof	3.54	.59	0.7%
3020	Roof Openings	Roof hatches		S.F. Roof	.12	.02	
C INTERIORS							
1010	Partitions	Gypsum board on metal studs with sound deadening board	9 S.F. Floor/L.F. Partition	S.F. Partition	3.91	4.34	31.0%
1020	Interior Doors	Single leaf hollow metal	90 S.F. Floor/Door	Each	537	5.97	
1030	Fittings	Hospital Curtains		S.F. Floor	.76	.76	
2010	Stair Construction	Concrete filled metal pan		Flight	4100	.53	
3010	Wall Finishes	40% vinyl wall covering, 35% ceramic tile, 25% epoxy coating		S.F. Surface	5.41	6.01	
3020	Floor Finishes	60% vinyl tile, 20% ceramic, 20% terrazzo		S.F. Floor	6.83	6.83	
3030	Ceiling Finishes	Plaster on suspended metal lath		S.F. Ceiling	3.71	3.71	
D SERVICES							
	D10 Conveying						
1010	Elevators & Lifts	Six geared hospital elevators		Each	147,000	4.41	4.9%
1020	Escalators & Moving Walks	N/A		—	—	—	
	D20 Plumbing						
2010	Plumbing Fixtures	Kitchen, toilet and service fixtures, supply and drainage	1 Fixture/275 S.F. Floor	Each	3495	12.71	16.0%
2020	Domestic Water Distribution	Electric water heater		S.F. Floor	1.48	1.48	
2040	Rain Water Drainage	Roof drains		S.F. Floor	2.22	.37	
	D30 HVAC						
3010	Energy Supply	Oil fired hot water, wall fin radiation		S.F. Floor	3.06	3.06	5.7%
3020	Heat Generating Systems	N/A		—	—	—	
3030	Cooling Generating Systems	Chilled water, fan coil units		S.F. Floor	2.08	2.08	
3050	Terminal & Package Units	N/A		—	—	—	
3090	Other HVAC Sys. & Equipment	N/A		—	—	—	
	D40 Fire Protection						
4010	Sprinklers	Wet pipe sprinkler system		S.F. Floor	1.22	1.22	1.5%
4020	Standpipes	Standpipe		S.F. Floor	.10	.10	
	D50 Electrical						
5010	Electrical Service/Distribution	4000 ampere service, panel board and feeders		S.F. Floor	1.15	1.15	12.4%
5020	Lighting & Branch Wiring	Fluorescent fixtures, receptacles, switches, A.C. and misc. power		S.F. Floor	7.61	7.61	
5030	Communications & Security	Alarm systems, communications system, emergency lighting and emergency generator		S.F. Floor	2.08	2.08	
5090	Other Electrical Systems	Emergency generator, 500 kW		S.F. Floor	.51	.51	
E EQUIPMENT & FURNISHINGS							
1010	Commercial Equipment	N/A		—	—	—	3.7%
1020	Institutional Equipment	Conductive flooring, oxygen piping, curtain partitions		S.F. Floor	.35	.35	
1030	Vehicular Equipment	N/A		—	—	—	
1090	Other Equipment	Patient wall systems		S.F. Floor	3.02	3.02	
F SPECIAL CONSTRUCTION & DEMOLITION							
1020	Integrated Construction	N/A		—	—	—	0.0%
1040	Special Facilities	N/A		—	—	—	
G BUILDING SITEWORK		**N/A**					
					Sub-Total	90.80	**100%**
	CONTRACTOR FEES (General Requirements: 10%, Overhead: 5%, Profit: 10%)				25%	22.70	
	ARCHITECT FEES				9%	10.20	
					Total Building Cost	**123.70**	

Devin Learn
Construction Management
Dr. Messner
Lancaster General Hospital 5th & 6th Floor Fit-Out, Cardiac Elevator
Lancaster, Pennsylvania
10/5/06
Technical Assignment 1: Construction Project Management

A. Site Plan of Existing Conditions

The map above shows a large scale layout of the project location and surrounding areas including the off site construction parking lot that will be used for the duration of the project. In the map below you can see how the site is laid out on a smaller scale. This view allows the location of the material hoist, dumpsters, loading/unloading zone, tower crane and cardiac elevator to be shown in relation to the 5th and 6th floor fit-out. As you can see the site is surrounded by streets and existing buildings hindering maneuverability. Deliveries are further complicated because Lime Street runs directly in front of the project site is a one way street.



B. Local Conditions

The preferred method of construction in the region for commercial construction is steel structure with cast in place concrete slab on composite metal deck. This is the method of choice on the existing building containing the shell space that will be fit-out during this project as well as the rest of the hospital. This method fits into the local preferences for construction and also allows for open floor plans that are required for a hospital setting. Layout of the space can be easily changed by moving partition walls as the requirements of the hospital change allowing them to adapt to current needs.

Construction parking is not readily available in this urban site that is surrounded on three sides by tightly grouped residential row homes. Offsite parking has been acquired several blocks away at a local business and

construction personnel are bused in using a construction van furnished by the general contractor. There are several parking garages on-site including one on the ground floor below the project site, however these spaces are reserved for hospital staff and no construction vehicle are allowed.

Trash and recycled materials are placed in dumpsters located at ground level below the material hoist. This allows for the waste to be removed directly from the project site without having to travel through the occupied space of the hospital. Since eliminating the spread of dust and construction debris to occupied areas is extremely important to the hospital and its patients this means of waste removal is crucial to owner satisfaction.

The only phase of this project that does not take place in an existing shell space is the construction of the cardiac elevator. Due to this soil and subsurface water conditions only apply to this phase. The soil that will be excavated for the concrete footing that will support the elevated elevator shaft is clean fill that was backfilled against the existing building. Ground water levels are located below the excavation depth and will have no impact in this project. The only concern during this excavation would be underground utilities and sanitary lines that run to and from the existing building, however, these concerns were alleviated by plant engineering documents from the hospital and by the local municipality identifying no existing obstructions.

C. Client Information

The owner of this project is Lancaster General Hospital, a non-profit hospital with multiple facilities throughout the Lancaster region. This project is

part of their pre-planned growth, using existing shell space within the hospital. This project is one of several currently in progress within the hospital and the second shell space fit-out that Benchmark Construction Company Inc. has worked on in the last year. The first of which was a fit-out of a 30,000 sq/ft shell space on the 1st floor.

Since LGH is a non-profit hospital cost of projects is very important to them. Once a budget for a given project is created and is approved the construction costs must not exceed that budget. This can be difficult in a very-high tech project such as this, with high quality standards and tight schedule restrictions. Quality of finishes and equipment are very important to the hospital due to the manner of work that will take place in this space once completed. They hold strict requirements on flooring finishes and wall protection due to the near constant rolling of beds and medical equipment throughout the hospital. Schedules are fast paced and face stoppages due to emergency situations that may arise at the hospital as well as by the helicopters landing on the landing pad located on the roof adjacent to the shell space and cardiac elevator sites. These are coordinated via radio with hospital staff and Lancaster County Communications. However on-time completion of work is still expected and penalties can be applied for late finishes. Safety expectations are extremely high when working in the hospital. Safety concerns not only apply to the construction workers on site but also to the patients and staff that are often in close proximity to construction sites. These safety requirements are monitored by hospital safety staff as well has Department of Health safety inspections. Some requirements include Infection

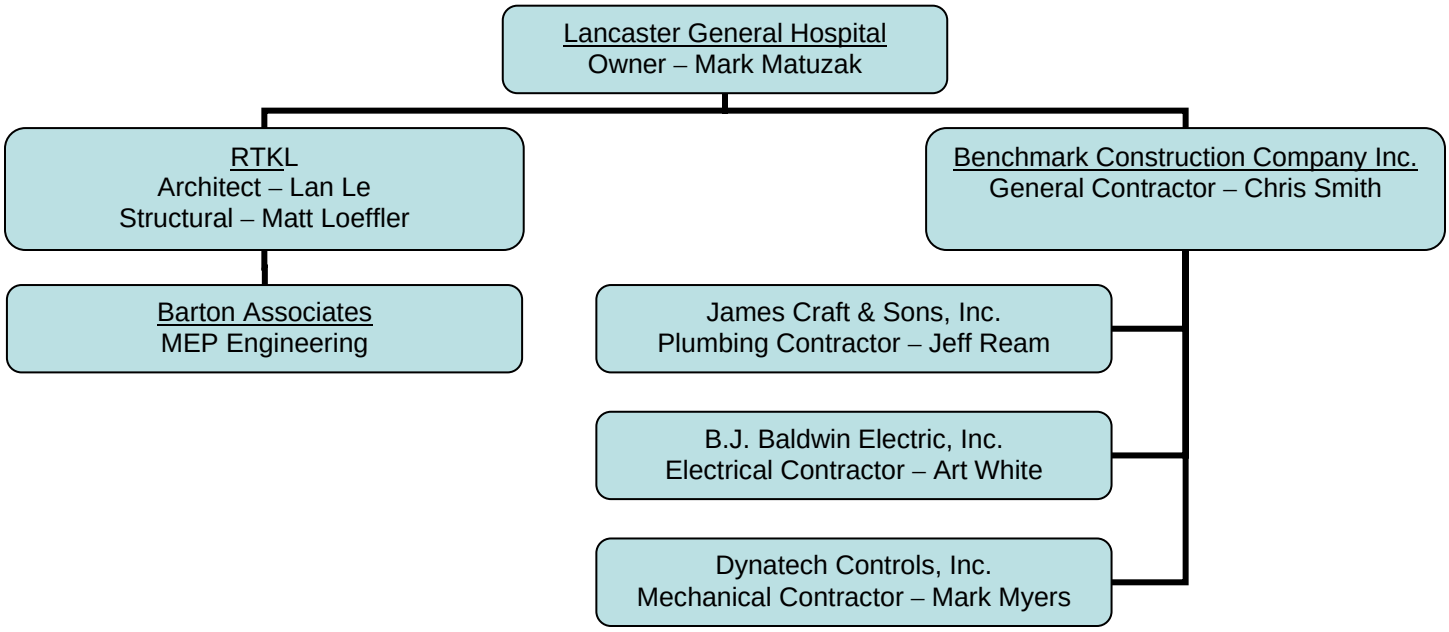
Control Risk Assessment (ICRA) partitions creating a barrier between construction space and occupied space. As well as creating negative pressure in construction spaces so that no dust or possible air born contaminants are pushed out into the occupied spaces. This is done by using negative air machines inside the construction space equipped with hepa filters that draw air from the space and force it outside.

This project is being completed inside an occupied, active hospital leading to the fact that there are dual occupancy requirements throughout the entire project. This is further complicated by the fact that there are occupied patient rooms directly below the 5th floor making through slab electrical and mechanical tie-ins even more complicated. Having this dual occupancy leads to restrictions of noise and vibration that would disturb patients or doctors and the sensitive equipment that they use. The hospital also restricts construction personnel traffic from entering the occupied corridors whenever possible. It is the hospitals wishes to make it appear that there is no construction going on at the hospital whenever possible.

The keys to completing this project to the owner's satisfaction go along with their expectations discussed in the previous paragraph. They expect the highest quality facility that can be created in a short period of time within the given budget. This is a common expectation of most owners' but is complicated by high-technology requirements. There are outside agencies that are involved in the construction process of healthcare facilities and they must also be satisfied in order for this project to be considered a success.

D. Project Delivery System

This project is being delivered through a design-bid-build method, utilizing a general contractor that works with the internal project managers from the hospital. This approach is used due to the experience of the owner in construction and the budget, schedule and quality constraints. Benchmark Construction Company Inc. was the only GC to bid the job due to their longtime experience and relationship with the owner; however it was competitively bid to subcontract/vendor marketplace.



The architect was hired by the owner for design and engineering services and held a contract directly with the owner. The architect utilized an in house engineer to complete the small amount of structural design for the project; however they subcontracted out the design of the MEP systems to Barton Associates. The general contractor was selected due to their experience and

relationship with work for the owner through a negotiated bid. They hold a guaranteed maximum price (GMP) contract (AIA A121) and (AIA A201) with the owner. The general contractor competitively bid the subcontractor/vendor marketplace. The subcontractors and vendors selected hold a typical AIA 111 contract directly with the general contractor.

There are no bonds required by the owner for this project. Insurance requirements are as follows contractor's liability insurance including workers compensation, comprehensive or commercial general liability, contractual liability, personal injury, business auto liability and umbrella excess liability. Owner's liability insurance including bodily injury, property damage and personal injury. All insurance coverage's shall be provided by insurance companies having policy holder ratings of no lower than "A" and financial ratings not lower than "XII" in the Best's Insurance Guide, latest edition in effect as of the date of the contract.

These contract types seem to be appropriate for this project allowing for less risk to be taken by the general contractor with a GMP contract meaning that there will be less contingency built into the price. This type of contract also allows for any savings on the project to go to the owner at which time he can decide who if anyone to share them with. A design-bid-build delivery method also benefits the owner in this type of high-technology high quality project, allowing for competitive bidding on a nearly complete design package.

E. Staffing Plan

The organizational structure for the general contractor starts with Chris Smith a project executive who oversees all projects with Lancaster General Hospital allowing for a strong working relationship to be developed. The two projects, 5th and 6th floor fit-out and cardiac elevator, are then split with Chris Zamilski a project manager running the cardiac elevator project and Rich Gill a project executive running the 5th and 6th floor fit-out project. Under Chris Zamilski is Rodney Richards who is a superintendent and will be responsible for any laborers and subcontractors on-site. Rich Gill has two superintendents under him one for each of the two floors as well as Barry Higgins who is the on-site MEP coordinator for Benchmark.