

Surgery Expansion Phase 1

Children's National Medical Center

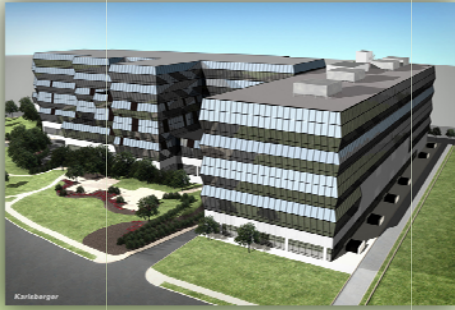
111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

Technical Report 1

Table of Contents

Executive Summary.....	2
A. Project Schedule Summary.....	3
B. Building Systems Summary.....	4
C. Project Cost Evaluation.....	6
D. Site Plan of Existing Conditions.....	8
E. Local Conditions.....	9
F. Client Information.....	10
G. Project Delivery System.....	11
H. Staffing Plan.....	12
Appendix A - Project Schedule.....	1 of 9
Appendix B - Project Cost Evaluation Documents.....	3 of 9
Appendix C - Site Plan.....	8 of 9



Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

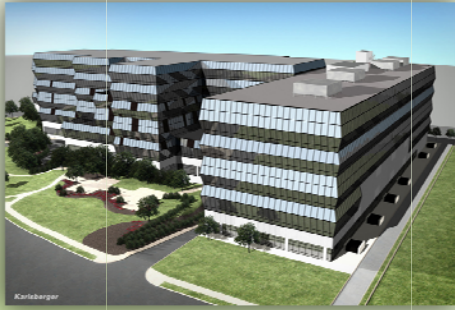
Executive Summary

Technical Assignment 1 was a highlight of the important facts for a construction thesis building. The Children's National Medical Center is a top pediatric hospital located in Washington, DC. It is currently experiencing multiple renovations of its east addition and surgical suites. The project being analyzed in this thesis project will be the Surgery Expansion Phase 1 renovation project.

Gilbane Building Company was the hired general contractor for a construction management at risk with guaranteed maximum price (GMP) type contract. KMLK Group, LLC is the hired owner's representative supervising all phases of work in the hospital. Gilbane is not a self-performing contractor, so all of the construction work was subcontracted. The original schedule was reasonably aggressive with a ten(10) month schedule, but asbestos was discovered in several of the building elements, requiring a new schedule to be established. The actual pricing of the building is within reason under two comparisons, considering the high end finishes and specialty equipment required by a pediatric surgery suite.

The site of this project is unusual and extremely congested. Special concerns include the ambulance drive adjacent to the site, infection control issues, working in an occupied space, and limited space outside of the building footprint. There is little to no staging and parking area, and the Gilbane site office is located on the 5th floor at the other end of the building. The existing building is six (6) stories tall with the unique feature of interstitial floors between each occupied floor. Although the structure is not being altered, it is unlike most other concrete buildings in Washington and primarily composed of structural steel. The main focus of the project is updating the mechanical and electrical systems to support two (2) new operating rooms and their support areas, with the capacity to handle other future planned renovations.

Questions brought about by this assignment so far are few. A more in depth look of medical gas systems, and special technology required by the operating rooms would help to explain the high mechanical costs. Also, it would be interesting to see what role the government plays in the operation of this hospital, due to the census required for expansion.



Surgery Expansion Phase 1

Children's National Medical Center

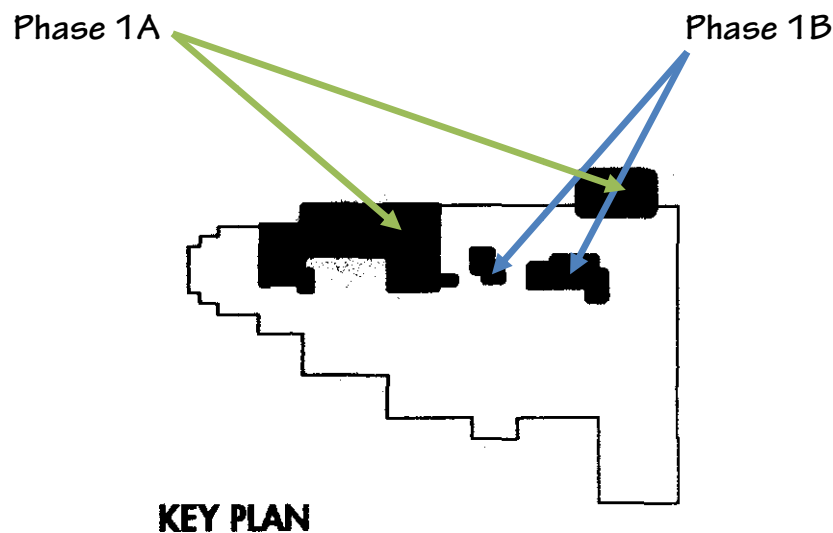
111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

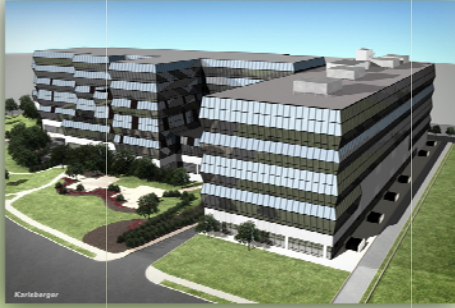
A. Project Schedule Summary (Appendix A)

To limit the impact of construction on the hospital the surgery expansion project was split into two phases: 1A, 1B. Phase 1A includes the majority of square footage with the offices being converted to operating and locker rooms, and the decontamination building. Phase 1B contains the renovations being made to the on-call, reception and registration, and waiting areas designated on the second floor. The demolition for both phases will be completed at the same time to limit the hospital's exposure to dirt and dust.

Scheduling this project was difficult due to the discovery of asbestos shortly prior to the beginning of construction. The hospital was required to hire a certified company to handle the abatement process, and the project was delayed significantly. The new construction schedule will be ready on October 4th, 2007.



Please See Appendix A for the full project schedule.



Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

B. Building Systems Summary

Yes	No	Scope of Work
X		Demolition
	X	Structural Steel
	X	Cast In Place Concrete
	X	Precast Concrete
X		Mechanical System
X		Electrical System
	X	Masonry
	X	Curtain Wall
	X	Support Excavation

Demolition

Due to the nature of this project as a renovation in an occupied space, demolition is a special issue. The materials being removed include but are not limited to drywall, finished floors, electrical conduit and panels, telecommunications installations, framework, and mechanical systems elements. A separate contractor was hired for demolition of the general elements, and each specialty contractor is responsible for demolition of materials within their respective bid package. Part of the demolition is to cut, cap and make safe any electrical wiring.

Prior to construction, testing was performed and asbestos was found in the building, which was originally built in the 1970s. The owner was responsible for hiring a certified contractor for abatement before the rest of the demolition and construction could commence.

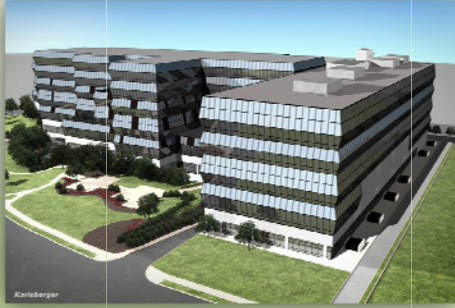
Structure

All structural design was built previously, and no new work was required. See [Building Statistics Part II](#) for more information.

Mechanical System

The original mechanical system in the building is complex due to the major changes it has gone through since its conception. It was designed to use interstitial floor levels to house all the components of the HVAC system and allow for more flexibility in changing the layout of each floor. The system now uses the interstitial floors as housing for the components as prescribed by design. It acts as an extra large plenum space.

The mechanical renovations for the surgery expansion project required the demolition and removal of all duct work, air devices, dampers, valves, fittings, hangers, insulation and piping unless noted. The contractor will cut, cap and make safe at the level of the metal decking any penetrations no longer in use. Most existing thermostats and connections are to be removed as well. The hot and chilled water lines, low pressure steam and medical gas lines are also being removed. Four air-conditioning units are being removed, and replacement for the nitrous oxide manifold is being considered.



Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

All necessary duct work and piping required for the new layout will be installed. A new medium pressure steam line will be installed for sterilization purposes. Special focus will be on the installation of the new air-handling unit custom designed to handle the two new surgery suites. The new unit has a maximum capacity of 17,000 CFM, but it is designed for future use, and will be operating at a maximum capacity of 8,500 CFM at occupancy.

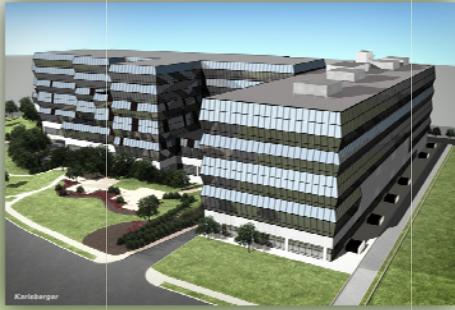
Electrical System

The primary feed into the building is 480Y/277 V 3 ϕ . Main electrical feeds for the surgery expansion project are located on the fifth floor. Power is dispersed throughout the building with the use of 2500 KVA network transformers and 4000A network substations housing 3P-800A circuit breakers. The largest emergency generator is 1360 KW, and is supported with multiple 900 KW backup emergency generators.

Construction for the surgery expansion includes the installation of twenty-five (25) new panelboards, and relocating three (3) panelboards. The panelboards range in size from 800A to 50A and are both 480Y/277V and 208Y/120V. Eighteen (18) new transformers are to be installed, including eight (8) 120V-24VAC.

Curtain Wall

All curtain wall elements were previously installed, and no new work was required. See [Building Statistics Part II](#) for more information.



Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

C. Project Cost Evaluation

Note: All cost/square foot calculations use the square foot measurement from Level 2 ONLY.

Building Details

Size (total renovation area): 45,312 ft² (Level 2)
 77,200 ft² (Level 1.5)
 77,200 ft² (Level 2.5)

Note: Levels 1.5 & 2.5 have MEP renovations only.

Number Of Stories: 1 floor at 14' height, 2 interstitial floors at 7'- 7"

Actual Building Construction Cost

Construction Cost (CC) = \$8,425,866

Note: This does not include permitting and asbestos abatement costs.

Construction Cost/Square Foot (CC/SF) = \$185.95/sf

Total Project Cost

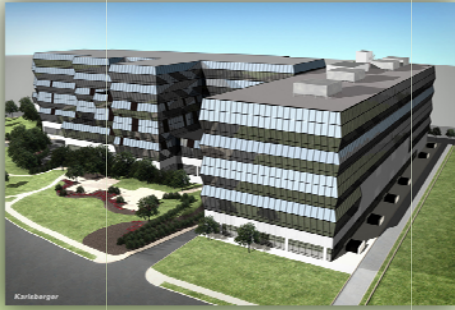
Total Cost (TC) = \$10,200,215

Note: TC=CC+ overhead + fee + contingency + profit.

Total Cost/Square Foot (TC/SF) = \$225.11/sf

Building Systems Cost

- Mechanical & Plumbing = **\$3,165,325**
 Cost/sf = \$69.86/sf
- Interior Finishes = **\$1,043,463**
 Cost/sf = \$23.03
- Electrical = **\$2,223,262**
 Cost/sf = \$49.07/sf
- Fire Protection & Spray Fireproofing = **\$395,202**
 Cost/sf = \$8.72/sf
- Structural and Miscellaneous Metals = **\$127,641**
 Cost/sf = \$2.82/sf
- Demolition and Temporary Partitions = **\$298,046**
 Cost/sf = \$6.58/sf



Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

Comparative Evaluation

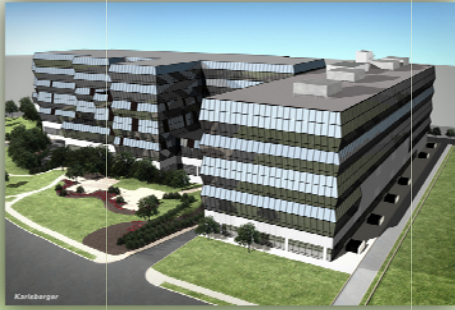
To gain a better understanding of this project's costs, two alternate estimates were prepared for a comparison.

D4COST - A cost estimate in D4COST was difficult to establish. The historical case used was a 4 story surgical expansion of roughly 160,000 sf. It was bid in 2000, and was built in Topeka, Kansas. Adapting the estimate to meet my project specifications required cutting the size by one fourth, and deleting all of the structural and exterior elements. *Please see Appendix B for the supporting documentation.* As shown in the chart below, the Construction Cost (CC) is relatively close to the real value.

RS Means – The second comparative cost analysis was a square foot analysis from RS Means 2007. It was a combination of two building types. Due to the size limitations of the two prototypes, the assemblies estimate values had to be used instead. The first project was M.330, a 2-3 story hospital with a 55,000 sf footprint. Prototype two was M.485, a 1 story outpatient surgery center. *Please see Appendix B for the supporting documentation.* Extra medical equipment was added separately to the average of the two buildings, and then a location factor was applied. This value was significantly lower than the actual estimate, which is most likely to be a result of the high end finishes being unaccounted for in the assemblies estimate.

Building Cost Comparative Analysis			
System	D4COST	RS Means	Actual
Interiors	\$1,178,860.00	\$661,484.40	\$1,043,463.00
Mechanical/Plumbing	\$3,442,891.00	\$2,983,583.84	\$3,165,325.00
Electrical	\$1,847,995.00	\$1,924,400.64	\$2,223,262.00
Structural	\$652,031.00	\$0.00	\$127,641.00
Fire Protection	\$600,116.00	\$0.00	\$395,202.00
Conveying Systems	\$168,849.00	\$46,475.00	\$145,087.00
Demoliton & Temp.	\$149,608.00	\$0.00	\$298,046.00
Equipment	\$0.00	\$115,635.00	\$0.00

Note: Any values with a \$0.00 cost were not applicable in that type of estimate form.



Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

D. Site Plan of Existing Conditions (Appendix C)

The Children's National Medical Center is located in the Northwest corner of the District of Columbia. It is on the same campus as the Washington Hospital Center. Because the Surgery Expansion project is a renovation of existing areas of the building, there is little being incorporated outside of the building's footprint. Prior to the construction of the OR suites, Clark Construction and Gilbane Building Company began construction of the East Addition. On the site plan locations the placement of their respective site offices will be shown.

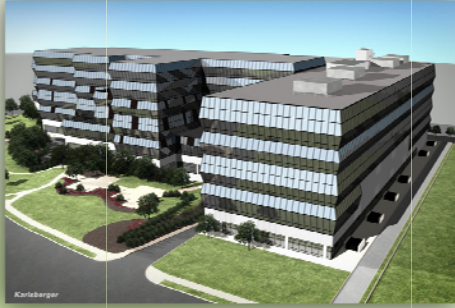
Vicinity Map



Children's National Medical Center

Note: Please click the picture for a complete version of the map furnished by <http://maps.google.com>

Please See Appendix C for the full Site Plan.



Surgery Expansion Phase 1

Children's National Medical Center

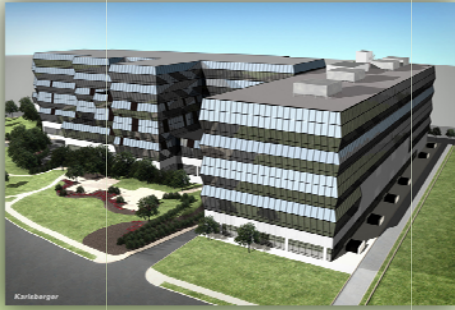
111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

E. Local Conditions

Parking – Parking for construction on this site is difficult. No contractor vehicles are allowed to park in the garage below the building, and may park in the lay-down areas with permission from the GC. All contractors are encouraged to bring employees to site in large passenger vans, which there are spaces to park on most occasions. If any separate vehicles need parking, including the GC staff, there is a public garage located adjacent to the Washington Hospital Center one block north. These garages have daily fees, but are usually reimbursable. Alternate metered parking is also located on First Street, NW between Michigan Avenue, NW and Channing Street.

Recycling –The materials recycled from site are glass, metal and wood. Each material is placed in a separate dumpster, and tipping fees depend on the amount of material being removed. Typically a thirty (30) yard dumpster costs \$440 dollars plus fuel and DC tax which is 5.74%. One company is paid to provide this service and is called one (1) day prior to date of dumpster replacement.



Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

F. Client Information

The Surgery Expansion Phase 1 project is an elemental piece of the grand plan for Children's National Medical Center (CNMC). With newer technologies and treatments being discovered, CNMC wants to be able to provide the best services from the best doctors. This renovation is not only a much needed update of older facilities, but also an expansion of capacity for a growing population. The two new operating rooms and support areas are accommodated by the new east addition patient center currently in the final stages of construction. This particular project has been split into two (2) phases, Phase 1A and 1B, to reduce the disturbance of the construction in the occupied hospital, and to bring the new facilities into use earlier. Mechanical and electrical updates from this project will allow for the increased capacity required by planned renovations of the future.

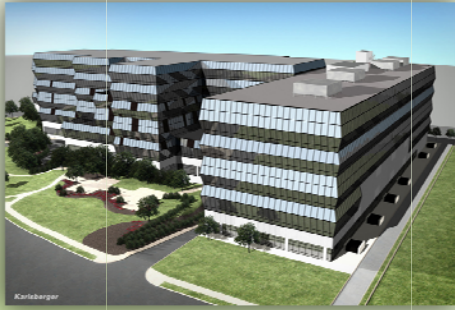
CNMC took a census and discovered the code from the Department of Health required more beds to accommodate the population. This enabled them to get a grant and pursue more doctors. Cost concerns for this project are limited, as the goal is to build top of the line spaces with the best technology available. High quality is the main priority with cost following as a secondary issue. The technology in the Critical Intensive Care Unit (CICU) comprises two (2) medical booms, one housing gas and the other medical equipment which would typically be on rolling carts to transfers between rooms.

The schedule for this project is a major concern as the ten (10) month schedule was pushed back repeatedly due to hazardous materials in the original construction. With the newest schedule recently provided, it will be of utmost importance to maintain the schedule and finish the project on time. Important sequencing concerns are to complete the nurse call station and IT network first, followed by emergency power.

The phases of the project are designed to reduce the congestion within the occupied hospital during construction. Phase 1A consists of the conversion of office space into the two (2) operating rooms, physicians' and nurses' locker rooms, and updated offices to support the surgical staff. It also includes the fit-out and renovation of the new decontamination building to achieve occupancy. Phase 1B is comprised of renovations for the on-call nurses' station, registration/reception areas, and waiting areas for the surgical suites. It also includes the placement of a new elevator.

Safety concerns for the project lie primarily with infection control and working within an occupied space. There is no exterior staging area so all the work must be performed within the building perimeter, and under the cleanest of conditions. Special considerations and procedures are already in place to prevent the infiltration of dust to the rest of the building, and to maintain a clean work site. Workers have distinct travel paths and operating procedures. To create a limited impact on the surrounding areas of limited working hours have been arranged, and any major shut-downs for tie-ins to the mechanical system will be performed during night hours.

Noise contamination is a large concern for this project as well. The area directly above Phase 1A in the main building houses the Critical Intensive Care Unit (CICU), and Phase 1B is underneath the Neonatal Intensive Care Unit (NICU). Special demolition and installation procedures have been outlined in the contract to keep noise and vibration to a minimum in these areas.



Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

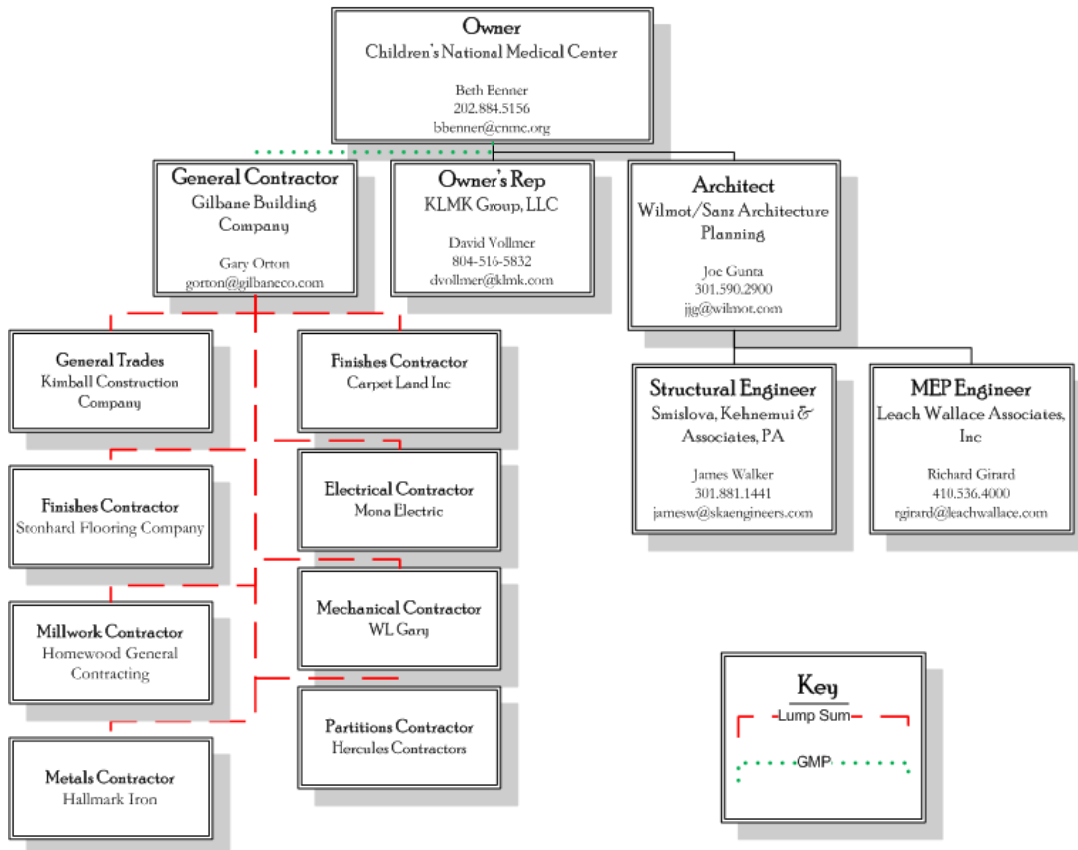
Andrea Klein • Construction Management • Advised By Dr. Messner

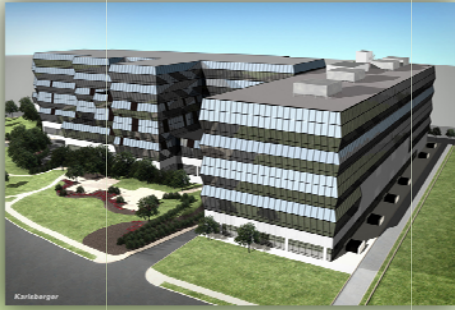
G. Project Delivery System

The surgery expansion project is a design-bid-build delivery method. Gilbane put in a bid to Children's National Medical Center and was awarded the project in the spring of 2007. Negotiations for a GMP contract commenced, while Gilbane bid out the thirteen (13) various packages to trade contractors. All of the contracts with trade contractors are lump sum contracts. Children's National Medical Center has an owner's representative of KLMK Group, LLC, specializing in hospital construction, to oversee all of its projects. Prior to construction asbestos was discovered, and the hospital holds a separate contract for the abatement process not shown on the following chart.

Children's National Medical Center

Surgery Expansion Phase 1





Surgery Expansion Phase 1

Children's National Medical Center

111 Michigan Avenue, NW • Washington, DC 20010

Andrea Klein • Construction Management • Advised By Dr. Messner

H. Staffing Plan

The staff situation on the surgery expansion project is unique. Gilbane Building Company currently has two projects underway at Children's National Medical Center. Both projects share the exact same staff except for the Assistant Superintendent. As shown on the site plan in Appendix ?, the temporary offices are located within the available shell space in the hospital, making it easy for the project staff to oversee the construction. No work is self-performed by Gilbane.

Gilbane Building Company

Staffing Plan

CNMC Surgery Expansion Project Phase 1

