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## Technical Assignment #1

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## Construction Project Management

### Executive Summary

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The Kennedy Krieger Institute Outpatient Medical Center is a 6 story cast in place structure. It is located in downtown Baltimore on the corner of East Madison Avenue and North Broadway and is next to the Existing Kennedy Krieger Institute and the John Hopkins Medical University. This building includes 30 exam rooms, 15 treatment rooms, several conference rooms, 54 offices and a physical therapy/occupational therapy gym, a spinal cord gym, and a physical therapy Natatorium, which includes two pools varying in size. In order to start excavation and construction, an existing parking lot will need to be first removed. Once the parking lot is removed, construction on site will begin. The Outpatient Medical Center is being constructed beside the Kennedy Krieger Institute Parking Garage which was recently built and it will utilize parking for the two Kennedy Krieger buildings in that location.

Once the project is completed it will be The Kennedy Krieger Institute Outpatient Medical Center and The Harry and Jeanette Weinberg Developmental Disabilities Center. The primary project team members are as follow:

- The Kennedy Krieger Institute (Owner): [www.kennedykrieger.org/](http://www.kennedykrieger.org/)
- Stanley Beaman & Sears (Architect): [www.stanleybeamansears.com/](http://www.stanleybeamansears.com/)
- The Whiting Turner Contracting Co. (Contractor): [www.whiting-turner.com](http://www.whiting-turner.com)

### Project Schedule Summary

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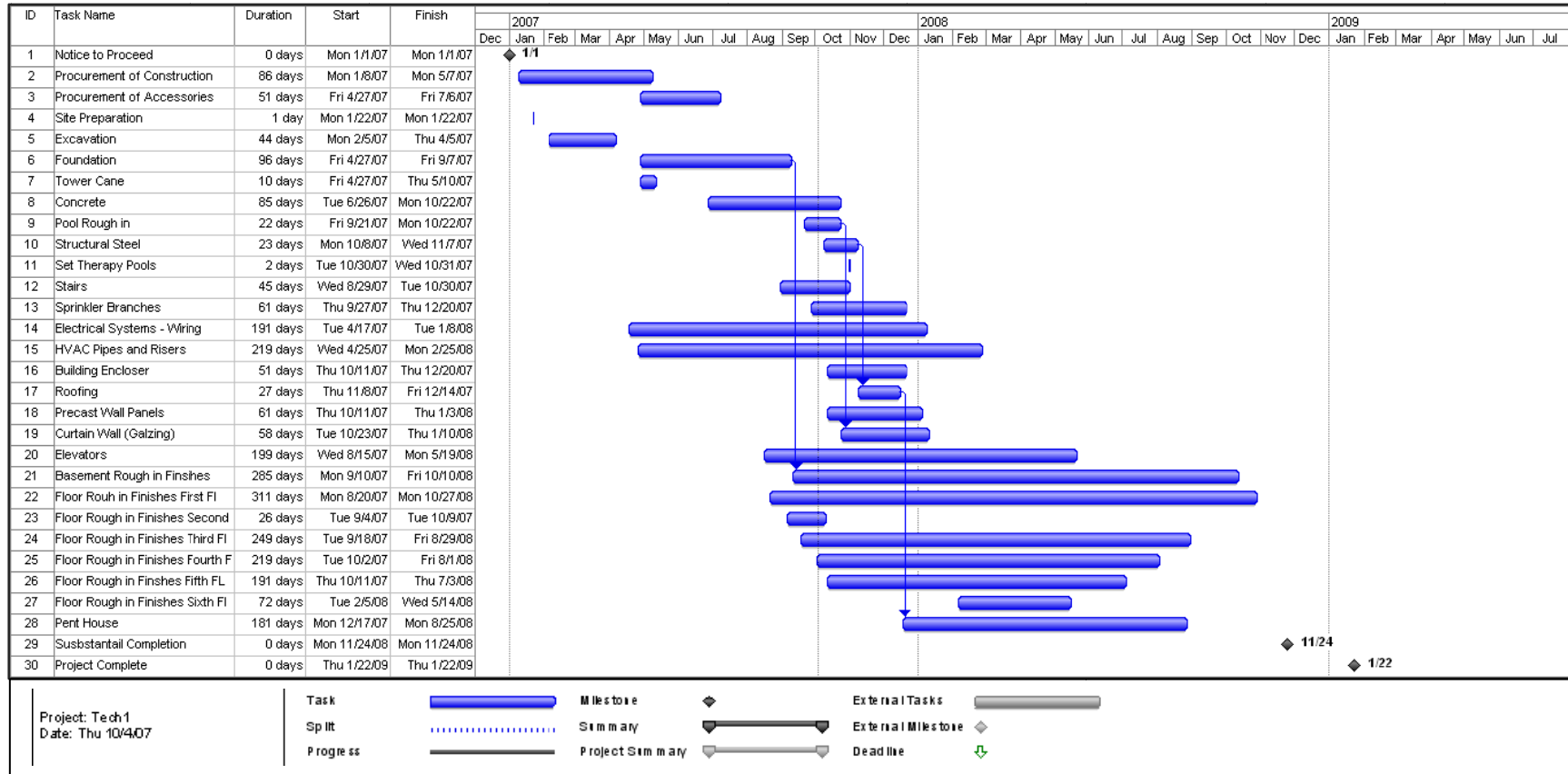
The project schedule, which is found on the next page, consists of the major constructions tasks. It starts with the notice to proceed and continues with each critical item. Such critical items are the excavation, foundation system and cast in place concrete. Keeping the main building structure on schedule is important so that other trades don't start late, which could then lead to a late finish. The project is scheduled to be under construction for 24 months and is scheduled to be completed on January 22, 2009.

Katie Sennett  
 Adviser: Dr. Messner  
 Oct. 5, 2007



The Kennedy Krieger Institute  
 Outpatient Medical Center  
 Baltimore, Maryland

## Project Schedule





## Building Systems Summary

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

### ◆ *Demolition/Excavation*

Demolition was needed to remove an existing parking lot. Once the parking lot was removed, excavation took place. Excavation at the south side was about 50 feet below the street level and the rest was surface grading from the north side toward the area where the foundation system would be installed (at the south end of the site). All site soils that were excavated were permanently removed from site.

### ◆ *Structural Steel*

Structural steel is used on the sixth floor penthouse area. Wide flange structural steel is carbon steel, ASTM A992, Grade 50. High strength bolts, nuts, and washers are ASMT 325 and have a mechanically deposited zinc-coating ASTM B695, class 50. Cold formed structural steel tubing is ASTM A500, Grade B material. The Structural steel is for the cooling tower framing, elevator connections, and to enclose the roof area.

### ◆ *Cast In Place*

The entire Medical center is cast in place concrete; this includes the foundation mat system, floors, and columns but excludes the 6<sup>th</sup> floor roof system which consists of structural steel. The foundation system consists of several mat slabs which are placed under the elevators, the columns, and exterior walls. Foundations are approximately 3 feet thick and vary in surface area depending on the item it is supporting. The floors are a pan and joist system with a floor thickness of 6 inches and joist spacing about every 8 inches on center. The columns are an average size of 30 inches in diameter and are located about every 24 feet from north to south and about every 29 feet east to west. Concrete compressive strength used throughout the building is 4000 psi concrete.



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### ◆ *Precast Concrete*

The exterior façade is made up of architectural precast concrete panels. Panels are made with a minimum of 5000 psi concrete, 28 day strength, and air entrained 5 to 7 percent. Connection devices are all stainless steel, which are connected to embedded plates, and angels. Grout is to be of a minimum strength of 10,000 psi, 28 day strength and will be tinted to coordinate with panels.

### ◆ *Mechanical System*

The mechanical system consists of 3 air handling units with 40,000 cfm. There is also 1 air handling unit for the natatorium which has a 5,500 cfm. There are 2 chiller units with a 245 ton capacity. The chiller towers are located in the penthouse. Mechanical rooms are located in the basement and one mechanical room is located on the fifth floor and is for the natatorium units only.

### ◆ *Electrical System*

The Outpatient Medical Center uses 2500 amp power source that enters the building at its main switch board. The building also has twenty one 480/270 3 phase distribution switch boards and forty four 208/120 3 phase distribution switch boards and a 1500kVA transformer. The lighting in the building is mainly 277 volt lighting fixtures.

### ◆ *Curtain wall*

The curtain wall consists of aluminum frames with vision glazing and glass infill panels at the building's exterior as well as the canopy at the front entrance. The glazing used is one of five different types of glazing, some are tempered and some are filter, all are tinted.

### ◆ *Support for excavation*

Standard sheeting and shoring is used, which includes steel wide flange piles, with wood inlay to hold back the ground, and a several wailers to provide more structural support.



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## Project Cost Evaluation

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Total Building Area = 115,000 SF

◆ Construction Cost

- \$32,840,888
- \$285.57 / SF

◆ Total Project Cost

- \$35,156,010
- \$305.70 / SF

◆ Major Building Systems

- Electrical
  - \$3,382,300
  - \$29.41 / SF
- Structural
  - Concrete: \$4,181,700
    - \$36.36 / SF
  - Structural Steel: \$441,300
    - \$3.84 / SF
- Mechanical
  - \$5,658,700
  - \$49.20 / SF



## D4 Cost Estimate

2007-KKI - OMC					
Target Date and Location		Building Size			
Jan	2007	MD - Baltimore	115,000		
Currently Selected: <b>Electrical</b>					
Div. #	Division/Subdivision	Base Cost(11	%	Sq. Cost	Projected(11513
01	General Requirem...	1,159,700	5.87	10.08	1,159,700
03	Concrete	4,181,700	21.17	36.36	4,181,700
05	Metals	1,440,265	7.29	12.52	1,440,265
06	Wood, Plastics, a...	587,953	2.98	5.11	587,953
07	Thermal and Moist...	277,700	1.41	2.41	277,700
09	Finishes	2,531,970	12.82	22.02	2,531,970
10	Specialties	32,000	0.16	0.28	32,000
21	Fire Suppression	498,788	2.53	4.34	498,788
23	HVAC	5,658,700	28.65	49.21	5,658,700
26	Electrical	3,382,300	17.12	29.41	3,382,300
Total Building Cost		19,751,076	100.00	171.75	19,751,076
Total Project Cost		19,751,076			19,751,076

The D4 cost Estimate is not equivalent to the total cost of the project because it is only an estimate of the items listed in the above D4 Cost projection.

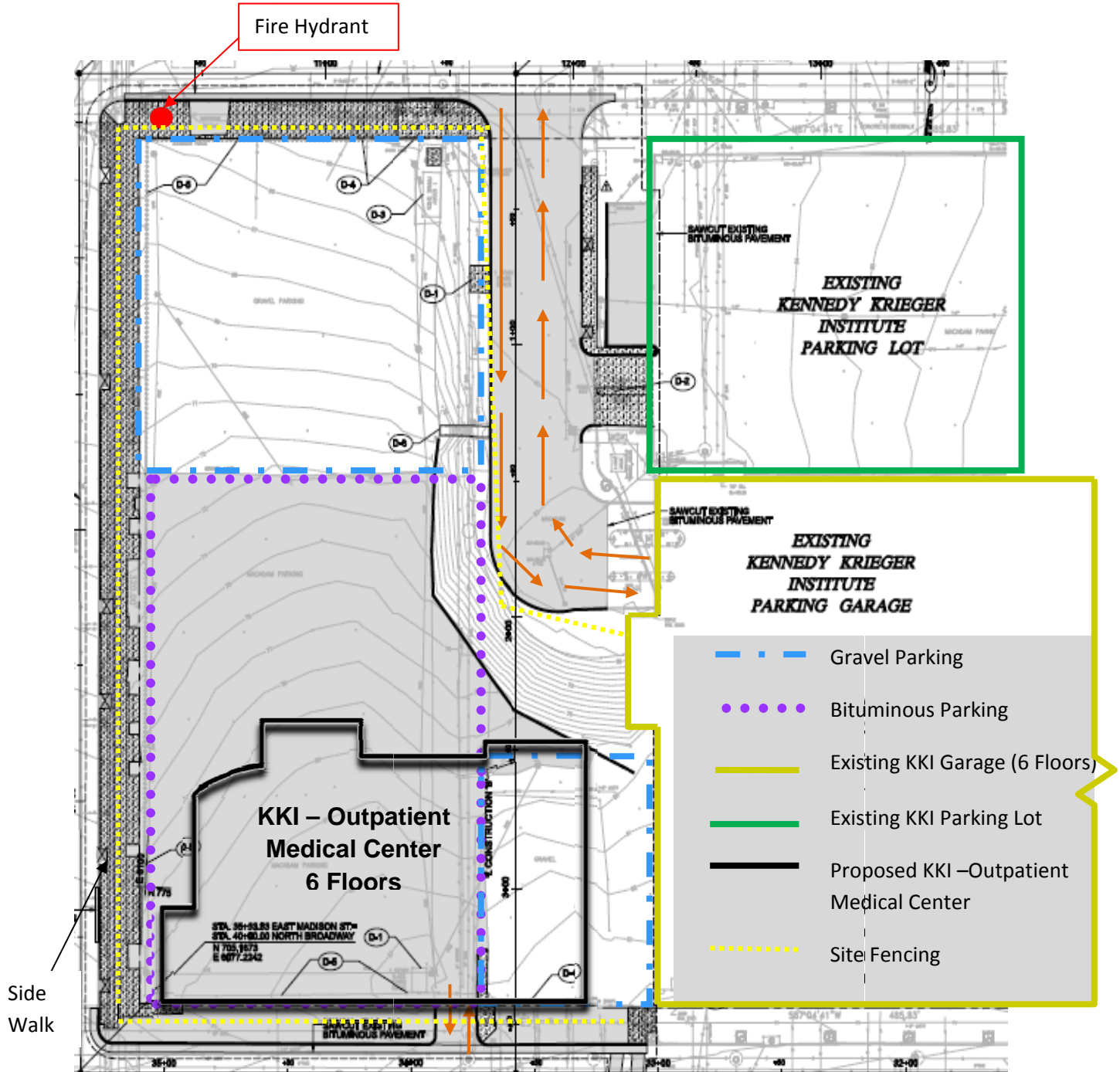
## Square Foot Estimate

R.S. Means Square Foot Estimate: Hospital	Unit	Unit Costs			KKI-OMC
		1/4	Median	3/4	
<b>Total Project Costs</b>	SF	172	212	310	305.7
<b>HVAC</b>	SF	22	28	37.5	49.2
<b>Electrical</b>	SF	18.8	24.5	38	29.41

The R.S Means Square Foot estimate compared to the actual cost shows that the Medical Center is at the higher end of the hospital market. This could be because of all the specialized equipment and developmental disabilities care that the medical center provides for its patients.



# Site Plan







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## Local Conditions

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The site is part of a “PUD” which is a “Planned Unit Development”. This development is a creation of and monitored by the Baltimore City Zoning Code. It helps to keep order in the city and every project must be submitted to the board and approved before construction can take place.

Other than the planned unit development, Baltimore does not have specific regulations on what types of building are constructed, such as a concrete structure compared to a steel structure. For this project, concrete was the best type of material to use. It was a little more costly, but was quicker to erect and had less procurement time. This would help jump start the project and increase the chances of completing in a timely manner, which makes a happy owner.

Baltimore City is a quite congested area so the site had just enough room for storing supplies and no room for parking. Subcontractors got a few spaces at the Kennedy Krieger Parking lot and garage that is located directly beside the construction site. Construction workers had to find parking on their own.

The site is about 60,000 SF. The workable and storage area is the 60,000 SF minus the estimated building foot print size of 19,000 SF. The site soil is mainly silty, meaning fine sand like material. This type of soil is for great drainage, so when it rained the ground would dry up very quickly. This led few weather delays during construction.

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## Client Information

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Kennedy Krieger Institute strives to help children and adolescents with development disabilities by providing personal patient care, professional training programs, research, and special education. Kennedy Krieger Institute is internationally known and provides its facilities with some of the world’s leading experts in the development disabilities field of study. Kennedy Krieger Institute is located Baltimore, Maryland. Their mission statement is:

*"We at the Kennedy Krieger Institute dedicate ourselves to helping children and adolescents with disorders of the brain and spinal cord achieve their potential and participate as fully as possible in family, school and community life."\**

The Outpatient Medical Center will house the developmental disabilities center. Once the project is complete, the building will have a large physical therapy occupational therapy gymnasium, therapy pools, many treatment and exam rooms, children life area, and a therapy garden that will be located near the entrance of the building. Kennedy Krieger is excited to be able to expand its institution and can’t wait to occupy the new facility.

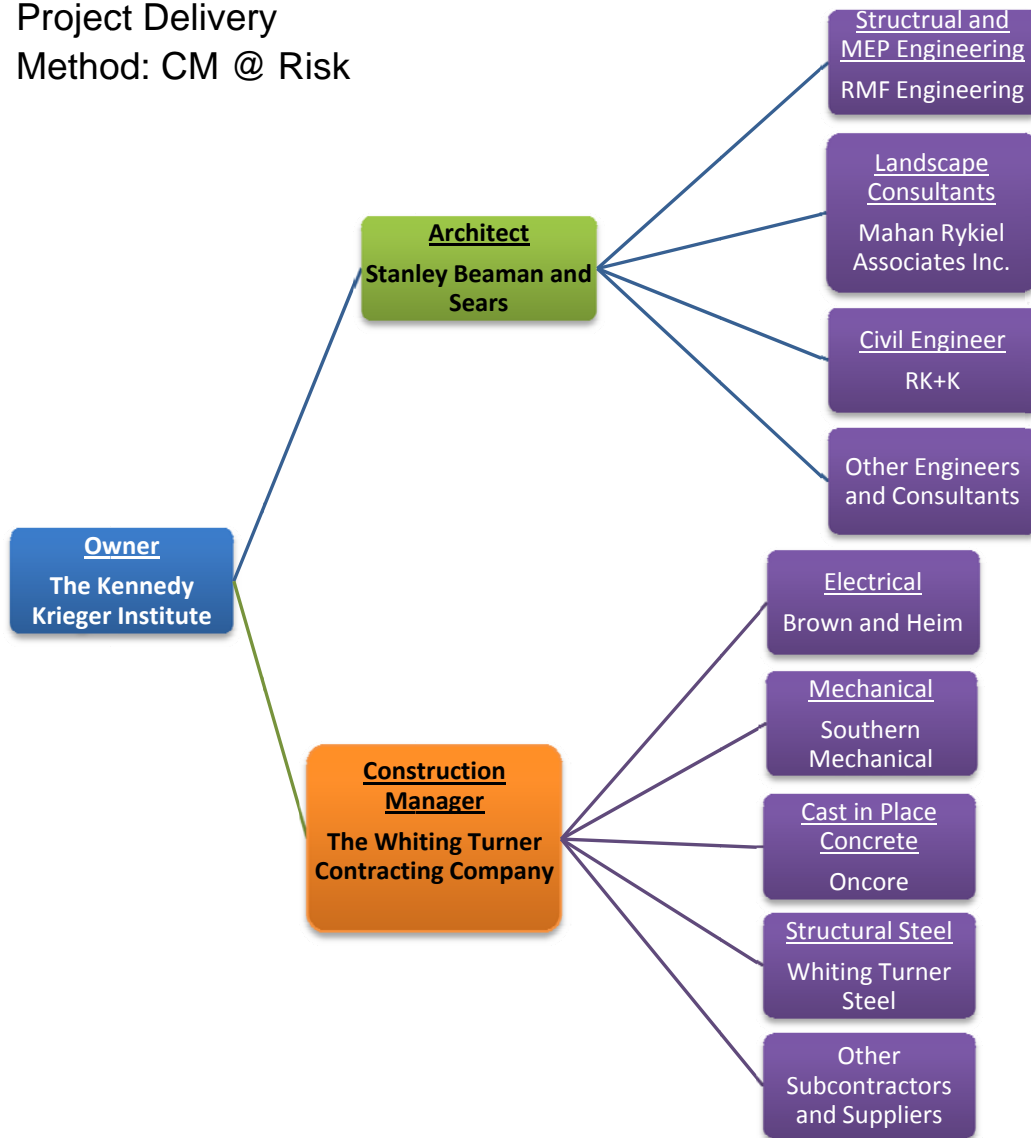
\*Quote is from the Kennedy Krieger Institute, more information can be found at [kennedykrieger.org](http://kennedykrieger.org)



## Project Delivery System

Contract types: — GMP — Cost + Fee — Lump Sum

Project Delivery  
Method: CM @ Risk



The above organizational chart shows that Whiting Turner acts as the CM at risk and holds a GMP contract with the owner. Whiting has lump sum contracts with all its subcontractors. The owner has a cost plus a fee contract with the Architect. The Architect also has cost plus a fee with the Engineers. This is the typical AIA standard for a CM at Risk.



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## Staffing Plan

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The organizational chart below shows all people involved with the construction of the Outpatient Medical Center. The Vice President acts as the project executive and spends most of his time working from the main corporate office. The rest of the staff works onsite to ensure construction is being done to the proper specifications according to the architect, engineers, and owner. The Senior Project Manager is responsible for all activities that take place onsite and is responsible for all the employees' below, except the vice president. He makes sure that the project engineers are on top of their tasks and makes sure that subcontractors are doing what they are contracted to do. All the engineers have several different trade responsibilities, such as waterproofing, glazing, and electrical mechanical, plumbing equipment and so on. Each engineer and manager must keep everyone up to date on what their trades are doing because they need to coordinate their trades with their coworkers' trades. The superintendent and asst. superintendent work onsite to ensure that supplies are being delivered and placed in the right location onsite and they ensure that the construction workers and subcontractors are doing their trades properly and safely. They also help with communicating construction issues and help the project managers to decide what the best solution is.

