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AE

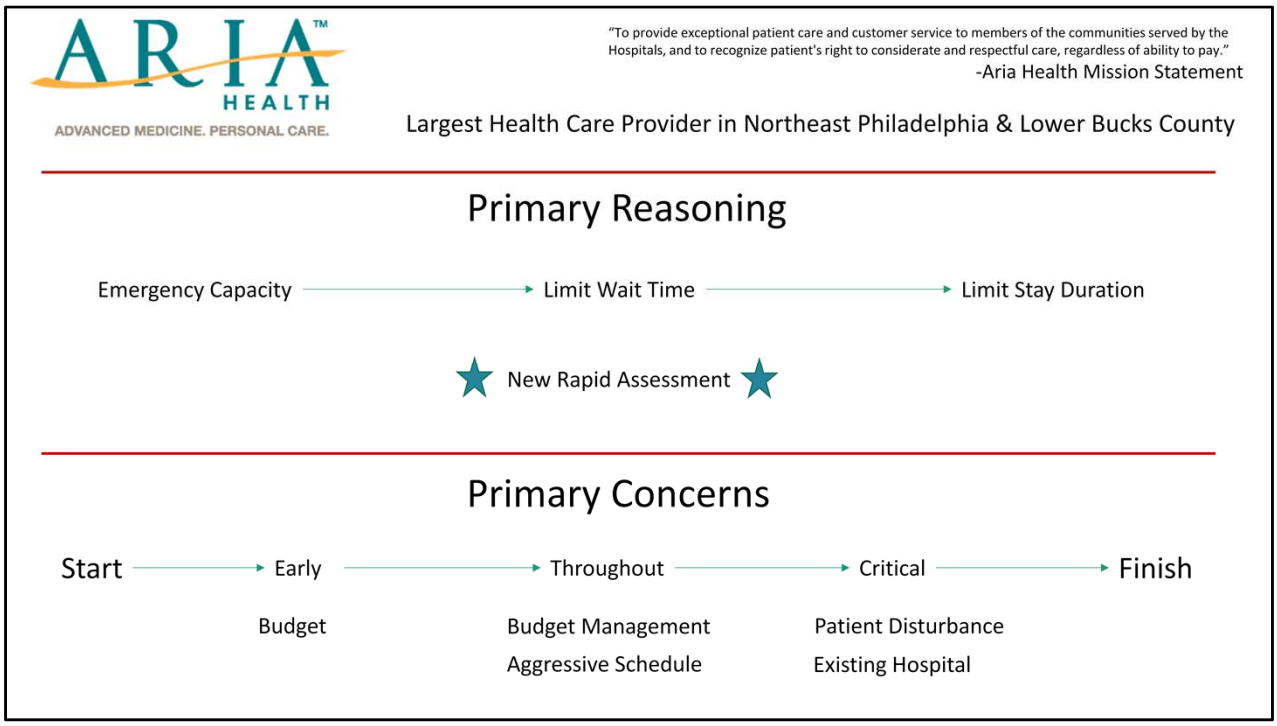
Construction
September 23, 2013

Aria Health

Torresdale Campus

Emergency Department Expansion

- Special thanks to Turner Project Manager, Patrick Kershner, for providing me the above renderings, as well as all of the necessary information within this presentation.

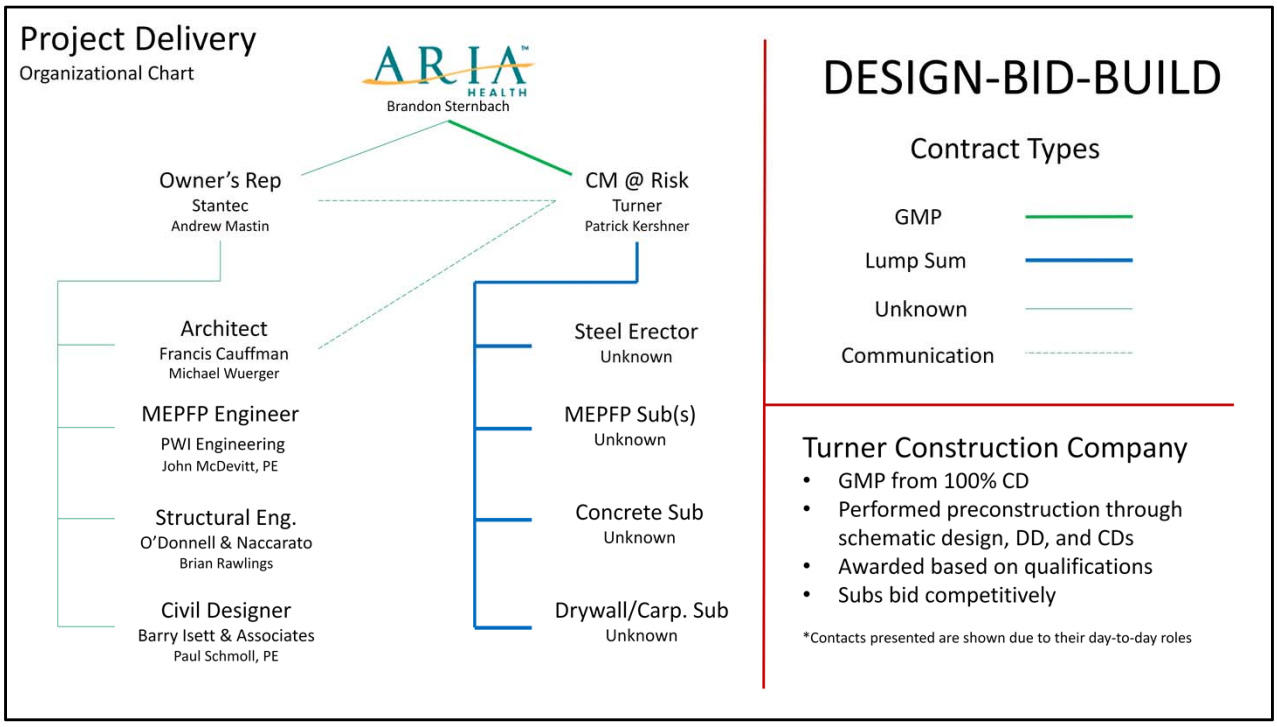


Primary Reasoning:

- Aria Health systems is the largest healthcare provider within the Northeast Philadelphia and Lower Bucks County areas.
- In response to the need for higher emergency medical care capacity, Aria has decided to proceed with the $35 Million Emergency Department Expansion Project.
- With the many additional triage patient rooms, the increased area will provide less wait time for those needing immediate care.
- The new "Rapid Assessment" approach to emergency medicine will help doctors sort through less urgent patient cases, ultimately limiting the duration of overnight hospital stay.

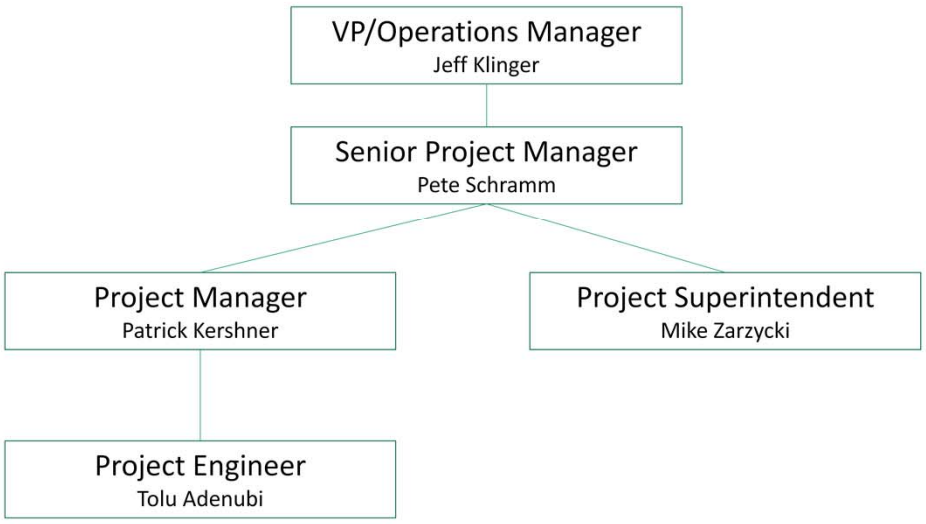
Primary Concerns

- To get the project moving, budget was initially the owner's primary concern.
- As the project has progressed, managing that budget in conjunction with meeting an aggressive schedule has proved to be vital.
- The project coincides with an existing and fully operational hospital, in which patient and public disturbance must be kept to an absolute minimum.
- The operational logistics and rerouting of patient and staff has proven to be a difficult transition.



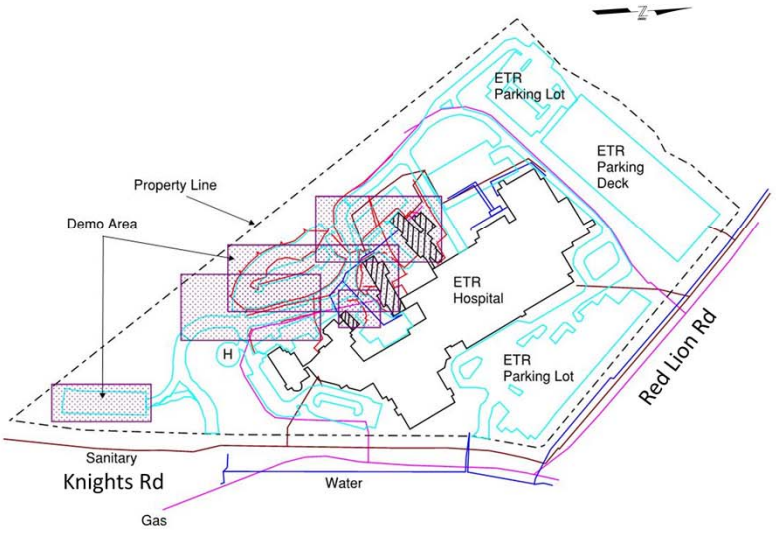
- Aria Health has hired Stantec as their representative throughout the design and construction process. Stantec fulfills the day-to-day role of the owner on-site.
- Turner Construction Company has been awarded the project based on qualifications and performed preconstruction services during the schematic and development phases of design through the completion of construction documents.
- Turner has been contracted as a CM at Risk directly to Aria, in which the GMP was agreed upon with 100% of construction documents complete.
- Each of the subs have been contractually bound to Turner through Lump Sum agreements in a traditional design-bid-build format.
- The Architect responsible for design if Francis Cauffman, with whom Turner has direct communication.
- The contractual agreements between Aria, Stantec, and the Design Team are unknown.

Staffing Plan for CM



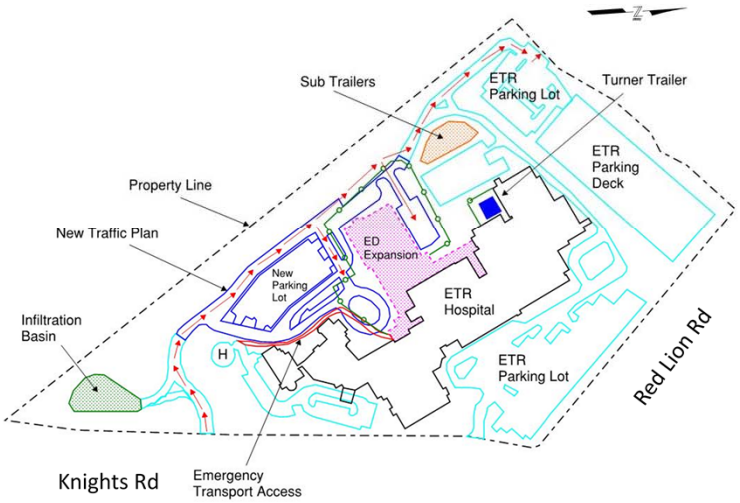
- The above staffing plan depicts the Turner Project Team as constructed for the Aria ED Expansion Project.
- There are no full-time safety or assistant field personnel on site.
- Patrick Kershner, Tolu Adenubi, and Mike Zarzycki reside on the project full-time, while Pete Schramm and Jeff Klinger do not.

Existing Conditions & Utilities



- The above graphic shows the existing site and utility conditions. To the East beneath Red Lion Road, the existing gas, water, and sanitary mains can be seen. Each of the mains then continue along Knights Road to the South. There are utility main taps off of Red Lion and Knights roads, each of which enter the existing hospital in different locations. The existing underground electric is shown in red to the West of the existing building. Shown in light blue, the existing roadways, parking lots, and parking deck are present. In preparation for the addition of the new emergency department, extensive demolition of existing structures, parking lots, underground utilities, and hospital interiors and systems was necessary. Areas to be demolished are shown in hatched rectangles. The existing hospital structures being torn down to make room for the new building are shown in black hatch.
- The underground electric has been removed to make room for a new medium voltage line to enter the building. The existing medium voltage switchgear will also be removed to be replaced with new.
- To the Southwest, an existing gravel pit will be removed to replaced with a new infiltration basin.
- During the demolition of the existing structures, some asbestos and lead containing products had to be properly handled. Asbestos abatement efforts were required before the final tear down.

Current Site Layout

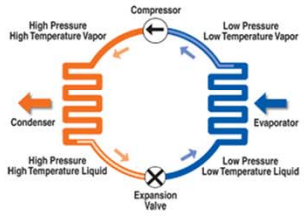


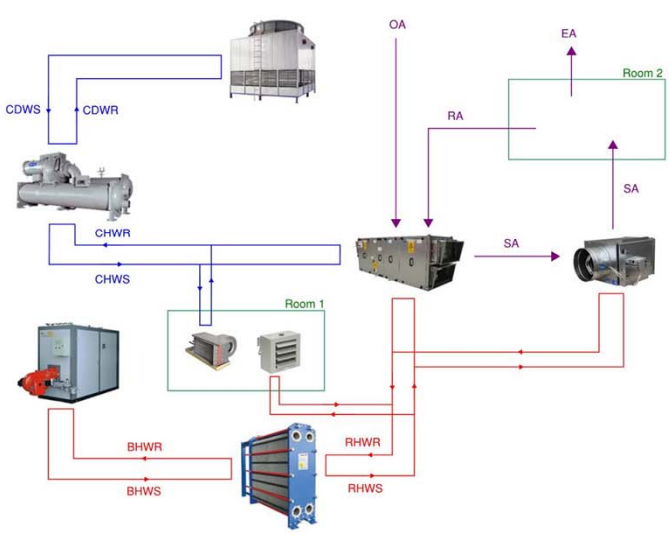
- As shown in purple hatch, the new emergency department addition can be seen. The building will be tied into the existing hospital on the West side. During excavation for the new building foundation, some unexpected rock was encountered. Also during excavation, dewatering efforts were necessary due to inclement weather.
- Soil conditions were considered suitable for load bearing capability, however along and underneath the existing building, lagging was necessary to prevent collapse and cave-in.
- As can be seen in dark blue, the new parking lot and roadway will be constructed to the Southwest of the emergency department addition. The existing helipad can be seen to the West, where emergency transport access, shown in red, will be maintained throughout the duration of the project.
- Construction traffic will enter on the South end of the project site, continue North and stop at one of two locations on either side of the addition. Traffic will then continue past the subcontractor trailers to the right and exit at the North end of the property.
- Shown in green is the construction site fence that surrounds the new building, as well as a separate fence that encompasses the Turner construction trailer shown in blue.
- Daily patient, staff, and public access and traffic patterns will be maintained to the East and North of the existing hospital.
- Also, shown in green hatch, the new infiltration basin is shown.

Building Systems

- The building begins with a reinforced concrete foundation wall, supported by a continuous strip footing. Concrete spread footings then support the remaining structural steel superstructure which is composed of composite beam and metal deck assembly. Slab on grade and slab on metal deck consist of normal weight concrete at a minimum compressive strength of 3500PSI, with the exception of the second floor Northwest deck slab which contains lightweight concrete. All concrete was cast in place within panelized forms using a pump truck.
- The exterior walls vary by location. In the entrance area, the building utilizes an aluminum curtain wall assembly complete with insulated glass and composite metal paneling. The curtain wall is supported by curtain wall anchor points, which are attached to the steel superstructure.
- In other areas, wall assemblies are complete with sheathing, rigid insulation, and face brick, supported by 6” metal studs. Masonry anchors fasten the brick to the structural stud. Precast concrete panels with an exterior paint finish are also used extensively and are supported similarly to the face brick.

Building Systems





- The Aria Expansion mechanical system consists of a traditional chiller/boiler system, with auxiliary components such as fan coil units and water source unit heaters. The building also includes some perimeter radiant heating, which is generated from hot water.
- On the cooling side, the system begins with water cooled chiller. Heat is absorbed by the refrigerant on the on the evaporator side, subsequently cooling the chilled water supply. On the condenser side, heat from the refrigerant is transferred to the condenser water supply, which is piped to the building cooling towers. The condenser water temperature then drops slightly, due to the heat being rejected to atmosphere within the cooling tower.
- The chilled water is then pumped the air handling units, where the water is transported through a coiling coil. The air handlers then mix return air with outside air and blow the mixed air through a series of filers. The filtered air then passes through the cooling coil, where the air condenses. The condensate is then trapped in a pan and drained. The now conditioned air is then ducted to the hospital VAV boxes, where the volume of air entering the occupied spaces is modulated. The VAV boxes are also equipped with hot water reheat coils for total temperature control. It should be noted that all areas supplied with outdoor air must be exhausted the same amount, unless the room is pressurized.
- Chilled water is also supplied to multiple fan coil units, which circulate room air over the

cooling coil. Outdoor air in these areas are supplied by a dedicated outdoor air unit in the mechanical room.

- On the heating side of the hospital mechanical system, boilers supply hot water to circulate through a plate and frame heat exchanger. This heat exchanger transfers heat to a closed loop of reheat water, which is then pumped to the VAV box reheat coils, the AHU heating coil, unit heaters, and perimeter radiators. It should be noted that the air handling units are most likely cooling-only, due to the VAV system. The heating coil within the AHUs is probably for morning warm-up in the dead of winter, when the air temperature is very low.
- The refrigeration cycle is shown above to illustrate the heat transfer process within the chillers. A simplified mechanical schematic to the right shows the water flow throughout the building.

Building Systems






- Outside the new building, the medium voltage switchgear is being replaced with a 1200A, 13.2KV, 3PH, 500 MVA switchgear due to the increase load of the addition. Two electrical feeds are then run to the two separate 1000KVA, 13.2KV transformers. The electricity is then stepped down to 480/277V and fed to a substation located inside the new building mechanical room.
- Four electrical feeds run to the life safety/critical/equipment/elevator ATS panel, a 400A, 480./277V cooling tower breaker, the 600A, 480/277V boiler room switchgear (which powers all equipment), and a 400A, 480/277V distribution for branch circuits. The branch circuits employ multiple auxiliary transformers to step down from 480/277V to 120/208V.
- On the critical back up side, a new 1MW diesel generator feeds the existing main distribution panel, as well as the emergency distribution panel which powers the four automatic transfer switches for life safety, elevator, equipment, and critical power.
- The building is equipped with med gas, med air, and med vac, as well as a standard hot and cold domestic water system. A medical air compressor and a medical vacuum pump are located in the basement mechanical room of the new ED addition.
- The building fire suppression system includes wet and pre-action systems, depending on the occupancy rating for the rooms being served. In high danger areas, wet pipe, quick response upright sprinkler heads are capable of pumping out 0.2 GPM. In areas where accidental discharge is a concern, pre-action sprinkler heads require two actions to be

released. This could include heating busting the sprinkler filament, smoke detector activation, or a pull station.

Actual Constructional Cost vs. Square Foot Estimate

Actual Cost of Building			
Hospital Expansion		**Sitework & Demolition**	
Direct Work Total	$23,781,585	Building & Interior Demo	$283,600
General Requirements	$504,000	Sitework/Utilities/Excavation	$2,776,700
Subgurad	$279,000	Landscaping	$202,000
CCIP	$737,000	Site Electric	$589,400
Subtotal	**$25,301,585**	General Requirements	$11,500
		Subguard	$44,400
General Conditions	$1,180,000	CCIP	$117,200
Building Permit	$40,000	**Sutotal**	**$4,024,800**
Construction Contingency	$688,415		
Subtotal	**$27,210,000**	General Conditions	$150,000
		Subtotal	**$4,174,800**
Turner Surety Bond	[redacted]		
Turner Insurance	[redacted]	Turner Insurance	[redacted]
Business Privilege Taxes	[redacted]	Business Privilege Taxes	[redacted]
Subtotal	**$27,623,000**	**Subtotal**	**$4,200,800**
Fee (FICTIONAL 10%)	$2,762,300	Fee (FICTIONAL 10%)	$420,080.0
Total	**$30,385,300**	**Total**	**$4,620,880**
Total Construction Cost	**$35,006,180**	**Cost/SF**	**$437.10**

Square Foot Estimate	
Avg Perimeter (LF)	926
Area (GSF)	80087
Avg Story Height (FT)	14.89
Base Cost/SF	$319.87
Perimeter Adjustment	$5.71
Story Height Adjustment	$4.71
Adjusted Cost/SF	$330.29
Square Foot Estimate	**$26,451,622.89**

Square Foot Estimate Assumptions

Known:
- Gross Area

Interpolations b/w 70,000SF and 85,000SF:
- Base Perimeter Length
- Base Cost/SF
- Perimeter Adjustment
- Story Height Adjustment

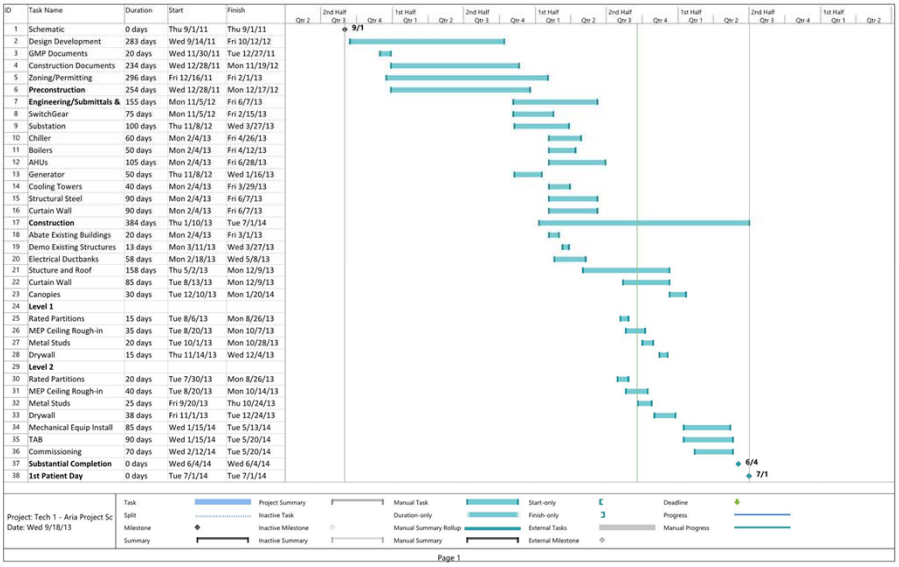
Primary Building Systems		
Trade	**Cost**	**% Direct Work**
Mechanical	$5,393,000	22.68%
Prepurchase-Mech	$1,491,298	6.27%
Electrical/Fire Alarm	$2,665,000	11.21%
Prepurchase-Elec	$1,742,600	7.33%
Electrical-Low Voltage	$955,000	4.02%
Structural Steel	$1,812,500	7.62%
Concrete	$1,467,000	6.17%
Masonry	$965,000	4.06%
Drywall/Carpentry	$2,051,400	8.63%

- The new Aria Health ED Expansion is being funded in part by the Redevelopment Assistance Capital Program, or RACP. The RACP is “a commonwealth grant program administered by the Office of the Budget for the acquisition and construction or regional economic, cultural, civic, and historical improvement projects.” The program is directly related to permanent and temporary job creation.
- As shown above, the total cost of construction for the project is approximately $35 Million, or $437/SF. This total includes all insurance, bonding, taxes, permits, site work, fees, and general conditions.
- The direct work total, excluding site work, demolition, taxes, fees, insurance, overhead, and profit, equates to approximately $24 Million.
- After performing a square foot cost estimate, the direct work cost was found to be approximately $26.5 Million, which is quite close to the actual direct work costs of $24 Million. R.S. Means accounts for overhead and profit, which could explain for the additional $2.5 Million not shown in the actual direct work costs. R.S. Means does not account for demolition, site work, and utility location, which could very well explain why the total construction cost of $35 Million.
- The primary building systems costs are also shown, mechanical proving to be the highest percentage of the overall project cost. This is to be expected considering the extensive mechanical equipment and material.

Project Schedule

Notable Dates

- Design
  9/1/11 – 11/19/12
- Preconstruction
  12/28/11 – 12/17/12
- Construction
  1/10/13 – 7/1/14
- Substantial Completion
  6/4/14
- 1st Patient Day
  7/1/14



ID	Task Name	Duration	Start	Finish
1	Schematic	0 days	Thu 9/1/11	Thu 9/1/11
2	Design Development	283 days	Wed 9/14/11	Fri 10/12/12
3	GMP Documents	20 days	Wed 11/30/11	Tue 12/27/11
4	Construction Documents	234 days	Wed 12/28/11	Mon 11/19/12
5	Zoning/Permitting	296 days	Fri 12/16/11	Fri 2/1/13
6	**Preconstruction**	254 days	Wed 12/28/11	Mon 12/17/12
7	**Engineering/Submittals &**	155 days	Mon 11/5/12	Fri 6/7/13
8	SwitchGear	75 days	Mon 11/5/12	Fri 2/15/13
9	Substation	100 days	Thu 11/8/12	Wed 3/27/13
10	Chiller	60 days	Mon 2/4/13	Fri 4/26/13
11	Boilers	50 days	Mon 2/4/13	Fri 4/12/13
12	AHUs	105 days	Mon 2/4/13	Fri 6/28/13
13	Generator	50 days	Thu 11/8/12	Wed 1/16/13
14	Cooling Towers	40 days	Mon 2/4/13	Fri 3/29/13
15	Structural Steel	90 days	Mon 2/4/13	Fri 6/7/13
16	Curtain Wall	90 days	Mon 2/4/13	Fri 6/7/13
17	**Construction**	384 days	Thu 1/10/13	Tue 7/1/14
18	Abate Existing Buildings	20 days	Mon 2/4/13	Fri 3/1/13
19	Demo Existing Structures	13 days	Mon 3/11/13	Wed 3/27/13
20	Electrical Ductbanks	58 days	Mon 2/18/13	Wed 5/8/13
21	Stucture and Roof	158 days	Thu 5/2/13	Mon 12/9/13
22	Curtain Wall	85 days	Tue 8/13/13	Mon 12/9/13
23	Canopies	30 days	Tue 12/10/13	Mon 1/20/14
24	**Level 1**			
25	Rated Partitions	15 days	Tue 8/6/13	Mon 8/26/13
26	MEP Ceiling Rough-in	35 days	Tue 8/20/13	Mon 10/7/13
27	Metal Studs	20 days	Tue 10/1/13	Mon 10/28/13
28	Drywall	15 days	Thu 11/14/13	Wed 12/4/13
29	**Level 2**			
30	Rated Partitions	20 days	Tue 7/30/13	Mon 8/26/13
31	MEP Ceiling Rough-in	40 days	Tue 8/20/13	Mon 10/14/13
32	Metal Studs	25 days	Fri 9/20/13	Thu 10/24/13
33	Drywall	38 days	Fri 11/1/13	Tue 12/24/13
34	Mechanical Equip Install	85 days	Wed 1/15/14	Tue 5/13/14
35	TAB	90 days	Wed 1/15/14	Tue 5/20/14
36	Commissioning	70 days	Wed 2/12/14	Tue 5/20/14
37	**Substantial Completion**	0 days	Wed 6/4/14	Wed 6/4/14
38	**1st Patient Day**	0 days	Tue 7/1/14	Tue 7/1/14

- The above graphic shows the overall project schedule including design, preconstruction, procurement, construction, and project closeout.
- The total design phase, including schematic design, design development, and construction documents lasted approximately 317 days, while preconstruction and long lead procurement last 254 days and 155 days, respectively.
- The construction phase of the project, including abatement and demolition, will prove 384 days to completion. The extensive time left aside for TAB and Commissioning should be noted, as these tasks reveal any issues that must be resolved before occupancy.
- Notable dates include:
  - Design day 1 – 9/1/11
  - Construction start – 1/10/13
  - Substantial completion – 6/4/14
  - First patient day – 7/1/14