Central Bed Tower Expansion

University of Virginia | Charlottesville, VA

Technical Assignment 1

September 23, 2011

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Construction Management

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Executive Summary

The University of Virginia Health System is expanding their hospital (the Hospital Bed Expansion) to accommodate the growing needs of the patients, visitors, and employees. The Hospital Bed Expansion will include six occupied floors redundant in design. Each floor will feature seven patient rooms facing Norwest. The 2nd floor is reserved for MEP space and will include a relief air plenum along with a transformer and electrical room. The project also includes the replacement of an existing ballasted EPDM roof with a new TPO roof. A green roof will also be installed on the first floor lobby. UVA is also updating parts of the hospital during the expansion project which will present interesting coordination issues.

Gilbane/Russell have been hired as a joint venture CM Agent to provide coordination and management services to the UVA Facilities Management team. SmithGroup has been hired as the architect via a lump sum contract. The UVA Facilities Management Team is holding a multiple prime contract with the subcontractors who are selected base upon prequalification data and a competitive.

The site is a tight area that is limited in space for material storage and parking. The Job Site trailers are located a block away from the actual site due to the congested area. While the Hospital Bed Expansion is being constructed, UVA has also begun the Emily Couric Cancer Center which will be built cattycorner to the current project site. This will complicate the area even more as two construction teams will attempt to keep traffic moving as smoothly as possible while still maintaining an efficient construction site. Gilbane/Russell has been hired as the CM Agent for the Emily Couric Cancer Center as well which will ease coordination issues.

Within the project site will be located portable toilets, dumpsters and a Manitowoc 888 crawler crane. The site will need to remain clean in order to allow concrete pump trucks, delivery trucks, and other vehicles to access the site safely. In order to create an efficient means of transportation to each floor, a hoist will be erected after the structural steel has topped out.

The Total Project Cost to date is around $55 million. When performing a square foot estimate, it was obvious that this project is a little more pricy than what is typically seen on normal hospital projects. Because this is an expansion combined with a renovation, the cost will definitely be higher than the typical $200/sf cost.

This project presents complicated coordination issues that will result in thoughtful ideas and solutions to these issues.

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Building Systems

The Hospital Bed Expansion is an expansion project combined with a restricted interior renovation reaching into the lobby, waiting rooms, and roof of the existing hospital. UVA expects to attain a LEED Silver rating with this project with design innovation and efficient construction. Because this addition is to be interwoven with the existing hospital, the design systems and construction materials being used on site will need to work effectively with the old structure while still pushing the limits of creative design.

Hazardous materials are not thought to be contained within the existing hospital, resulting in a more simple demolition process. The renovation areas existing within the construction boundary are to be stripped to the bare bones leaving only the steel structure, concrete slabs, any masonry, and interior partitions to be exposed. The MEP systems are to be relocated until a new system pattern can be established for the future layout of the space. Throughout the demolition, waste management processes will be utilized to ensure materials are directed to the proper disposal sites. This will contribute to the LEED Silver rating expected to be attained. While gutting the interior renovation area, the concrete slabs will need to be checked for proper a proper level surface in order to ensure a level finished floor is stable and that a solid connection is made between the two adjoining structures.

Cast in place concrete will mainly appear in the floor slabs; there will be some instances where a cmu firestop head wall will be seen in the corridors or stairwells. Because the new and existing structures will carry the entire load of the new addition, there will be no need for interior concrete walls. The floor system will consist of 4 ½" lightweight concrete poured on top of 2" gage galvanized metal deck making the total slab thickness 6 ½". The new patient bathrooms have been designed with a 4" depressed slab to allow space for the plumbing and fixtures within the room. Because the crane will be occupied with placing the steel, a crane and bucket method cannot be utilized. The most efficient means of pouring the concrete slabs is via concrete pumps.

The structural system consists of typical 'W' beams that will tie into the existing structure. Before structural steel can proceed, a number of existing columns need to be reinforced in the hospital to ensure a stable new structure that will work properly with the existing structure (See Fig. 1). The new steel will be bolted or welded into the existing columns, creating moment connections (See Fig. 2). In order to erect the steel a Manitowoc 888 crane was brought to the site. The 888 can easily handle the largest piece of steel on site which is a W24 x 131, but the reason for such a large crane being used was the placement and height restrictions. There is barely enough room on site to fit the crane, but in leaving a nice 50' path right next to the hospital, this crane can easily lift the heaviest beam to the 8th floor. There is also heavy mechanical equipment that will need to be lifted to the penthouse, in which case the crane will have no issues in accomplishing the task.

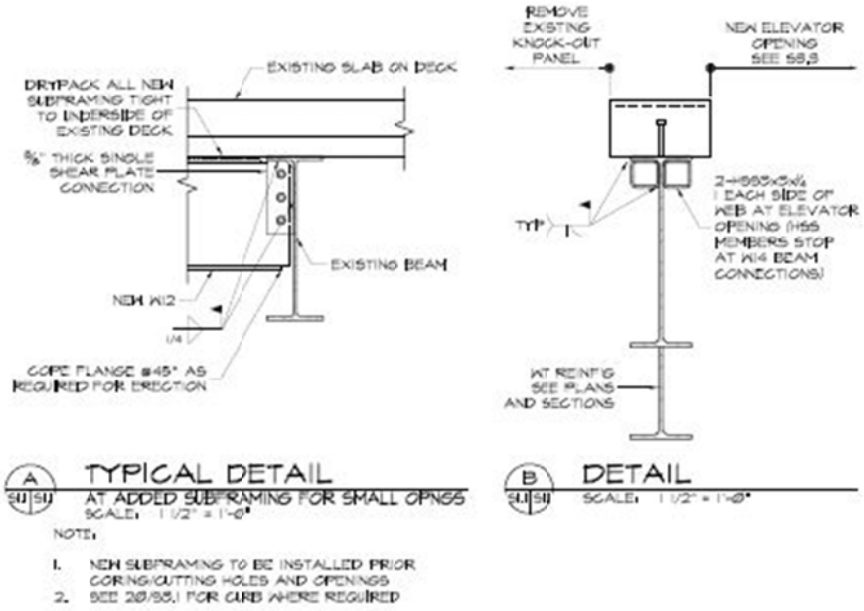

Fig. 1 shows a typical detail of the Steel Strengthening columns

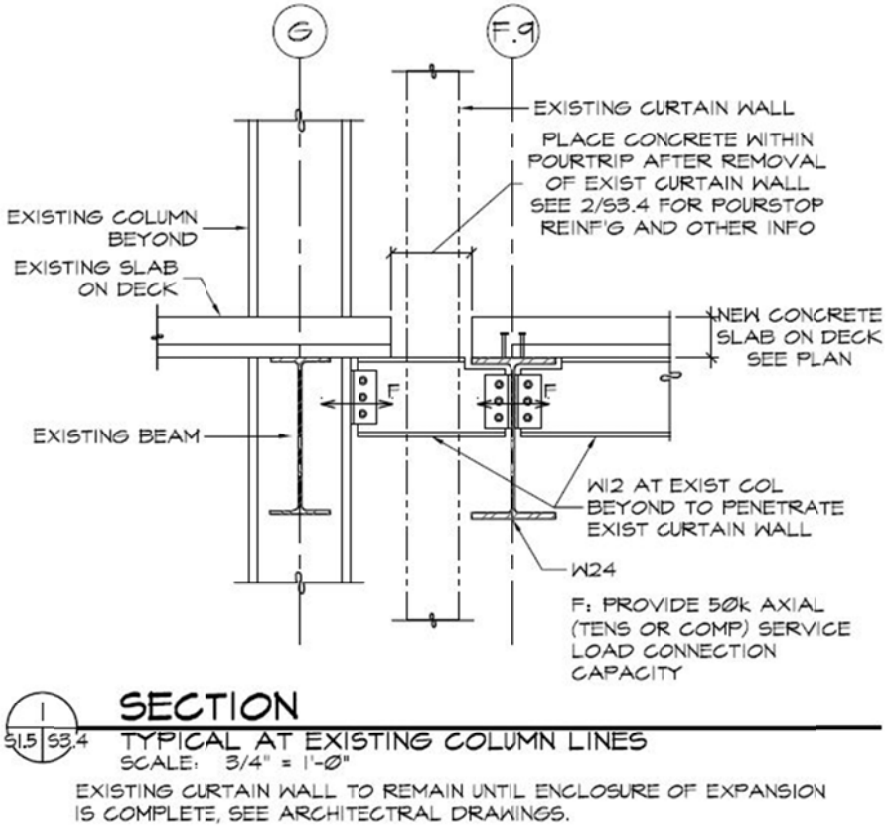

Fig. 2 shows a typical detail of the new connection at the column

The Mechanical System does not undergo much of a major addition. The 2nd floor of the new addition will be unoccupied space used for additional mechanical and electrical equipment. Eight air handling units exist in each wing of the hospital. Because the expansion is not adding much additional space, no further air handling units are necessary to keep up with the heating and cooling load. Half of the extra 6,500 SQFT will serve as a relief air plenum, while the other will hold a new transformer and electrical rooms. Some of the existing ductwork will be disconnected and capped to ensure that dust will not penetrate the system until the new ducts can be tied into the old ducts. The penthouse will be given an additional 25,000 CFM capacity plenum space as well as a 45,000 CFM capacity plenum where relief stacks will be added just above the plenum spaces to the roof (See Fig.3). The existing system utilizes chilled water cooling and steam heating systems.

Fig. 3 shows a new air plenum arriving on site.

The Electrical System will need to be expanded in order to support the additional loads. The additional electrical loads are not extensive, but with the hospital renovations, existing electrical systems will be upgraded to a better technical program. In order to support this, a transformer and electrical room will be added to the 2M Floor. The transformer will house a 4000A,480/270V system. The total capacity is 25000kVA dry and 3333kVA with fans. There will be two electrical closets on each floor, one existing electrical closet is along west side of the existing corridor; another additional electrical closet will be placed adjacent to the east stairwell. A penthouse power plan will expand the electrical power being supplied to the penthouse in order to allow for future additional mechanical equipment. Exhaust fans are to be provided by the mechanical contractor.

The curtain wall system consists of glass panels being supported by a steel bar system at each floor. The support system is referenced to be the "bullets". A hollow steel tube is attached to cantilevered steel beams at each level of the hospital. The actual glass panels will be attached to the hollow steel tube. Extending beyond the structural hollow tubes, are steel "bullet" like tubes (see Fig. 4) After the hoist is removed from the exterior of the building, the remaining glass panels can be installed.


Fig. 4 shows the curtain wall mockup & "bullet".

Site Plans

While HBE is being constructed, UVA also has two other projects in construction at the same time as HBE. The Emily Couric Cancer Center (ECCC) adjacent to this project will begin construction around the

same time as HBE. Before ECCC can be built, an existing parking garage will need to be demolished, causing more traffic complications on Lee Street. The cancer center is considerably larger than the Hospital Addition, but unfortunately the ECCC construction team has an equivalent amount of lay out space as the HBE construction team. Towards the end of the Cancer Center construction, another project will be starting up. The "Connective Elements" mission is to create a transportation hub that will seemingly connect the Lee Street Parking garage, University Hospital, and Emily Couric Cancer Center. The issue with this project coming on board is that the lay out space available after ECCC closes out will no longer be available as Connective Elements will be taking over that area; this all results in a very small work area for the teams at HBE.

Fig. 5 shows the tight project site layout.

The site plan for this project is small and complicated. Because not much space is available for staging areas or material storage, each subcontractor will need to find their own area for storing materials, or limit the materials brought on site to only what is needed for each day's workload (See Fig. 5)

EXISTING CONDITIONS

This site plan shows the existing structures before construction is underway on either the Emily Couric Cancer Center or the Hospital Bed Expansion. The future footprint of the cancer center is a parking garage located on the north side of Lee Street across from the Primary Care Center. The space between the two Lee Street Parking Garages is what was available to the cancer center team and now the Connective Elements team.

The Hospital Bed Expansion will be built on top of the existing hospital lobby, thus relinquishing any need for excavation (See Fig. 6). The location of HBE is on the south side of Lee Street facing the Primary Care Center at Northwest. There is a small space in front of the future construction site that was used for hospital drop-offs. This area will be fenced off, and the paved

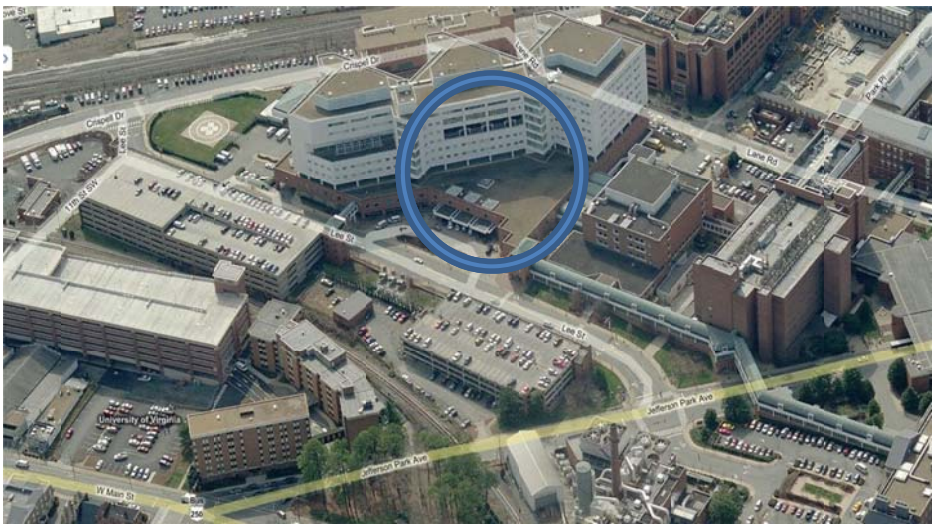

Fig. 6 shows where the new expansion will be located.

pull-offs will be used for construction vehicle entrances.

Most of the utilities including chilled water, electrical cables, plumbing, etc. run under Lee Street. Because there is no excavation on site, there is not much worry of interference with these utilities. However, there will be more electrical lines added to the hospital service equipment on the south side of the emergency department.

The emergency department is connected to the University Hospital. The ED is on the south side of the hospital and north side of Crispell Rd. There is a helipad on the ground that brings frequent traffic to the ED. Eventually this helipad will be relocated to the penthouse level of the hospital, allowing room for and Emergency Department expansion.

Lee Street is the main artery to the health system complex. With future construction on either side of this road, vehicular and pedestrian traffic will need to be heavily considered.

The job site trailers are located on the east side of 11th Street. Due to the limited amount of space close to the site, it was necessary to situate the job trailers in the current locale thanks to ample room. An empty lot next to the trailers is used for office and contractor personnel parking. An additional lot on Cherry Street is also used for contractor parking for when the 11th Street lot fills up.

PHASE I: STEEL STRENGTHENING

The footprints of HBE and ECCC are labeled and shaded to show the change in existing conditions.

In Phase I, steel strengthening and demolition is the work focus. As far as site layout is concerned, steel strengthening does not serve much of an impact on the area. Most of the layout necessary will be inside the hospital where ICRA walls will need to be built before steel strengthening can begin.

The fence will be placed around the paved area on the north side of the hospital. Portalets are lined again the fence to allow easy access for pump trucks and safe passage for workers. Dumpsters are placed next to the existing lobby for quick disposal of any materials leaving the building. Although the heavy demolition will not begin until after the new curtainwall is installed, small selective demolition will still be prevalent during this phase.

Because pedestrian traffic will be cut off from the old main entrance of the hospital, it will be necessary to place signs on the fence perimeter directing pedestrians to the side entrance of the hospital which leads directly to the main lobby. Overhead protection will not be necessary for pedestrians as the crane will not be swung overtop of the traffic patterns. Pedestrians approaching the hospital from the remaining 11th street garage will have any alterations in their traffic pattern, as there is a bridge connecting the hospital to the parking deck.

PHASE II: SUPERSTRUCTURE

As Phase II begins, the Manitowoc 888 crane will need to be assembled. Because of the heavy traffic area, this crane will need to be erected during off hours. Because of the limited space, the crane pieces

will be trucked to the site, and each tractor trailer will need to idle along Lee Street until their piece is ready to be connected (see Fig. 7). A crane pad will be leveled in front of the hospital lobby. There is enough space to allow around 60' of travel for the 888. Enough room exists for the concrete pump trucks to park on site and pour each floor.

Fig. 7 shows the erection of a 888 crane

Once the steel structure has been erected, a hoist will be placed on the Northeast corner of the building. Contractors are prohibited from using existing hospital elevators; until the new elevator bank is operational, laborers will need to use the hoist as their means of transportation to each level.

PHASE III: FINISHES

After the new elevators are operational, the hoist can be removed from the building exterior. There will be no more use for the crane on HBE; however, the crane will remain in this position for the Connective Elements and Helipad Relocation projects which will be utilizing the crane for their specific tasks.

As the interior demolition becomes more prevalent, a number of dumpsters will be necessary to hold all of the old materials. In this phase, the site will be tight with the crane, dumpsters, and portalets.

Project Schedule

Despite other complicated aspects in the construction process, the Hospital Bed Expansion can be considered to follow a typical construction schedule.

Because no excavation is necessary, procurement of the structural steel will begin early in the project construction. It was decided amongst the current project team to begin the structural steel procurement a month before the Notice to Proceed was even received by the University of Virginia Facilities Management. Before the erection process for structural steel can begin, a select number of existing steel columns need to be reinforced in order to support the new structural system and maintain a stable hospital.

Although small in comparison to the structural steel beams, the materials needed for steel strengthening still need to be procured and produced according the engineered design. In order for the project team to hit the ground running and avoid unnecessary time delays, this steel would have needed to begin its procurement process before the facilities management received the actual NTP for new construction. This also explains the early buy out of the Structural Steel package almost six months before the NTP was received. After the steel strengthening is properly completed, the structural steel can begin its erection process.

The actual structural steel required for this addition is limited due to the small size of the project. Although the steel is limited, the time required for placement is extensive due to time restrictions for use of the crane. The UVA Health System was concerned for the safety and welfare of their patients and visitors thus requiring all steel placement (including steel strengthening and structural steel) to be completed at the night hours from 9:00 PM to 6:00 AM. There is limited space for laydown of construction materials for this project; in order to conserve space and maintain a safe work area, all steel columns, beams, girders, etc. were to be picked and erected from the trailer bed each piece was trucked in on. This method, although effective, is time consuming and may cause delays on a project if not properly sequenced.

When structural steel tops out, the remaining floors can be poured followed by the installment of the new glass curtain wall system. Before the existing white metal panels can be removed, ICRA walls needed to be installed along the boundary of construction within the hospital, which happens to be an existing corridor. Upon completion of the glass curtain wall and ICRA wall installation, the existing white metal panels will then be removed from the interior of the newly placed addition. Before new interior work can begin, the existing interior systems within the construction boundary need to be selectively removed/demolished. Systems such as electrical, mechanical, plumbing, and sprinklers will be salvaged in order to tie in the new systems with the existing hospital.

Sequencing for the interior work is to begin at the 8th floor and finish at the 3rd floor. The intention of working from the top of the hospital is so the contractors can work their way out of the hospital without having to continually invade newly finished spaces. The floors will be released to the hospital in pairs starting with 8-7, 6-5, and ending with 4-3.

The 2nd floor is a dedicated mechanical space and will therefore be worked on separately from this sequence.

Project Cost Evaluation

The RS Means estimated square foot cost associated with this project is significantly lower than the actual cost to build (See Table 1). There are many factors in discussing this issue.

RS Means has estimated this project based upon the assumption that the building will be construction in an open field without any outside interferences. That is certainly not the case in this project. HBE is an expansion plus renovation. The costs are going to be hire due to dual occupancy challenges as well as OSHA requirements to maintain a sanitary environment in the hospital. The steel strengthening is also not considered in the RS Means Cost Estimate. This will have a huge impact on pricing for the steel package. If the columns needing steel strengthening are in occupied spaces, the ICRA requirements are also going to drive the cost up.

The percentages seem to be accurate. However, due to the small work for mechanical and electrical packages, it could be suggested that this pricing will be lower than what is estimated. The renovations

which were not considered in this analysis will play a big role in the higher cost for construction simply because of the dual occupancy issue and labor.

It could also be argued that the actual building has a more intricate design that what RS Means has assumed, and RS Means probably did not consider any green roofs.

Building Component	% of Total Building	RS Means SQFT Estimate	Actual SQFT Cost
Substructure	2.20%	$ 264,000.00	$ 1,210,000.00
Shell	23.00%	$ 2,760,000.00	$ 12,650,000.00
Interiors	2.02%	$ 242,400.00	$ 1,111,000.00
Elevators & Lifts	2.60%	$ 312,000.00	$ 1,430,000.00
Plumbing Fixtures	2.80%	$ 336,000.00	$ 1,540,000.00
Water Distribution	7.30%	$ 876,000.00	$ 4,015,000.00
Rain Water Drainag	0.75%	$ 90,000.00	$ 412,500.00
Energy Supply	1.40%	$ 168,000.00	$ 770,000.00
Heat Generating Systems	1.60%	$ 192,000.00	$ 880,000.00
Cooling Generating Systems	1.20%	$ 144,000.00	$ 660,000.00
Other Systems	11.60%	$ 1,392,000.00	$ 6,380,000.00
Sprinklers	1.00%	$ 120,000.00	$ 550,000.00
Standpipes	0.40%	$ 48,000.00	$ 220,000.00
Electrical Service/Distributior	5.90%	$ 708,000.00	$ 3,245,000.00
Lighting and Branch Wiring	7.70%	$ 924,000.00	$ 4,235,000.00
Communication and Security	0.80%	$ 96,000.00	$ 440,000.00
Equipment & Furnshings	7.40%	$ 888,000.00	$ 4,070,000.00
Total		$ 9,560,400.00	$ 43,818,500.00
Cost/SQFT		$ 200.00	$ 916.67

Table 1 shows the estimate breakdown of the HBE

Percentages provided are strictly based off of the RS Means SQFT estimate and do not reflect actual building costs.

Local Conditions

As mentioned previously, availability for construction parking is limited. Parking on site is only for utility vehicles performing work, and all other subcontractors must park in the 11th Street parking lot or Cherry Street lot. Parking is available in the parking decks, but either a permit or daily fee is necessary.

The obtained geotechnical report did not detail the types of soil existent on site. In 1984, a similar geotech test was performed with the actual soil data, however Schnabel Engineering South, LLC did include the historic data from 1984 in the report. However, Schnabel did report on previous boring tests revealing disintegrating rock in certain areas as well as rock refusal. After reviewing all historic data and performing their own tests, Schnabel recommended dewatering system at EL 478 for any excavation.

UVA attempts to incorporate SWaM (Small, Women, and Minority owned businesses) participation as much as possible.

Client Information

The University Health System (UHS) is the medical sector of UVA that offers learning opportunities to the relevant students of UVA, medical internships and fellowships for doctors, and premier health services for the residents of Charlottesville. With the growing population of Charlottesville, the hospital needed to expand their facilities in order to accommodate their growing number of patients. This addition will create 70 new private patient rooms while also updating the existing facility.

UVA has high standards for safety and quality. While cost and schedule play a role, UVA is willing to sacrifice a low budget and fast schedule for the safety of their doctors, patients, and visitors. While being a trailblazer in the new world of green technology, the University Health System also wants a home that will last them a 100 more years.

In the renovation side this expansion, an old Ballasted EPDM (Ethylene Propylene Diene Monomer) roof is causing problems with leakage. Not only is the roof allowing water to penetrate the building, but the system is outdated and hard to maintain. The UHS has decided to replace the Ballasted EPDM roof with a new energy efficient TPO (Thermoplastic Polyolefin) roof. This roof will reflect more heat from the sun keeping the rest of the hospital cooler with less energy.

Safety is the first consideration for any hospital system. In the design phase of the expansion, the architect was required to layout the patient rooms according to UVA's ADA regulations rather than the Federal Government's ADA regulations. The reason for this is because UVA has a much stricter set of rules in order to ensure the safety of their visitors.

Renovation of an occupied hospital proves to be incredibly challenging for not only the contractors, but also for the visitors and employees of the hospital as well. In order to maintain a sanitary area within the hospital, all construction areas are to be enclosed with ICRA walls. In the construction of HBE, many of these ICRA walls invaded patient rooms (for steel strengthening), waiting rooms (renovation of waiting rooms), and the main corridor. It is a dance to coordinate the interior renovations during the evening with the exterior construction during the day. The key here, is to keep the visitors and patients happy.

Project Delivery Method

The project is being delivered as design-build. The interesting aspect of this project is that UVA Facilities Management is acting as the CM and Gilbane/Russell is acting as the CM Agent. In this situation the Facilities Management is holding all of the contracts for the subcontractors and architect, which creates a multiple prime contract between UVA and each subcontractor. The relationship between UVA and the Architect is a typical lump sum where the architect will still hold the contracts with the engineers/consultants. The contract between Gilbane/Russell is a lump sum contract where G/R is present more for the coordination and backup of UVA Facilities Management.

It isn't unusual to see a university maintaining a multiple prime contract with the subcontractors. As is typical with an experienced owner, UVA wants to control who is selected to work on their project, and maintain the working relationships with the subcontractors on site. Each of the subcontractors were chosen by first being pre-qualified and then by competitive bid. It is understandable, however in this situation where four or five projects are underway all at once with Gilbane/Russell being the CM Agent/CM on all of them, it seems as though it would be easier to hand the contract over to Gilbane/Russell where they control the coordination with every project team.

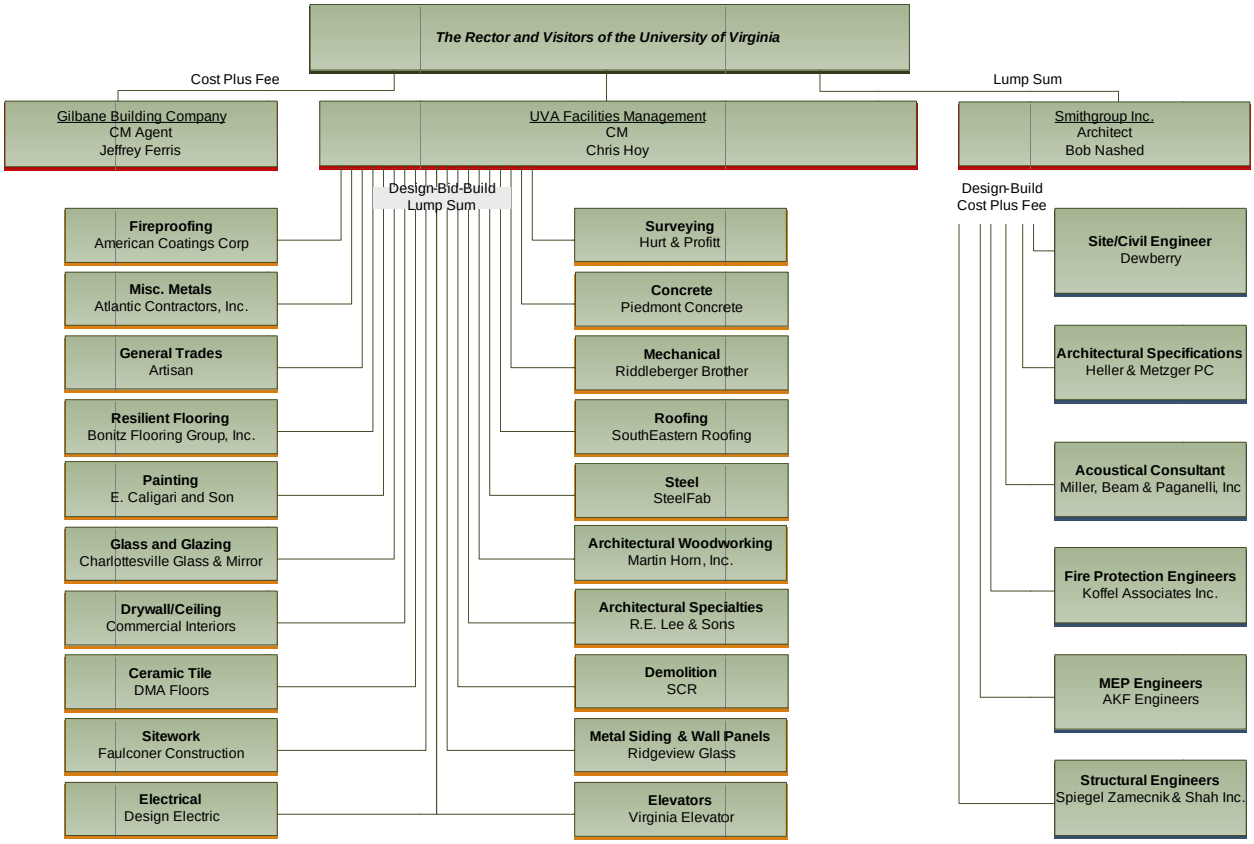

Chart 1 shows the organizational table

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Staffing Plan

The staffing plan for the CM Agent is relatively simple. John Taylor is the District Manager for Gilbane out of Richmond, VA. Jeff Ferris (Gilbane) is considered to be the Project Executive, but is acting as a Project Manager at the same level as Chris Hoy who is the Project Manager for UVA. Under Mr. Ferris lies the Office Administrator, Tammy Pastelnick (Gilbane); the Sr. Project Engineer Mellonee Rheams (Russell) who controls submittal, transmittal, RFI, and change order processing; and the Sr. General Superintendant Gary Crosby (Gilbane) who controls the field activities. Office Engineer Brett Thompson reports to Mellonee Rheams, and Assistant Superintendent Mike Moubray reports to Gary Crosby.

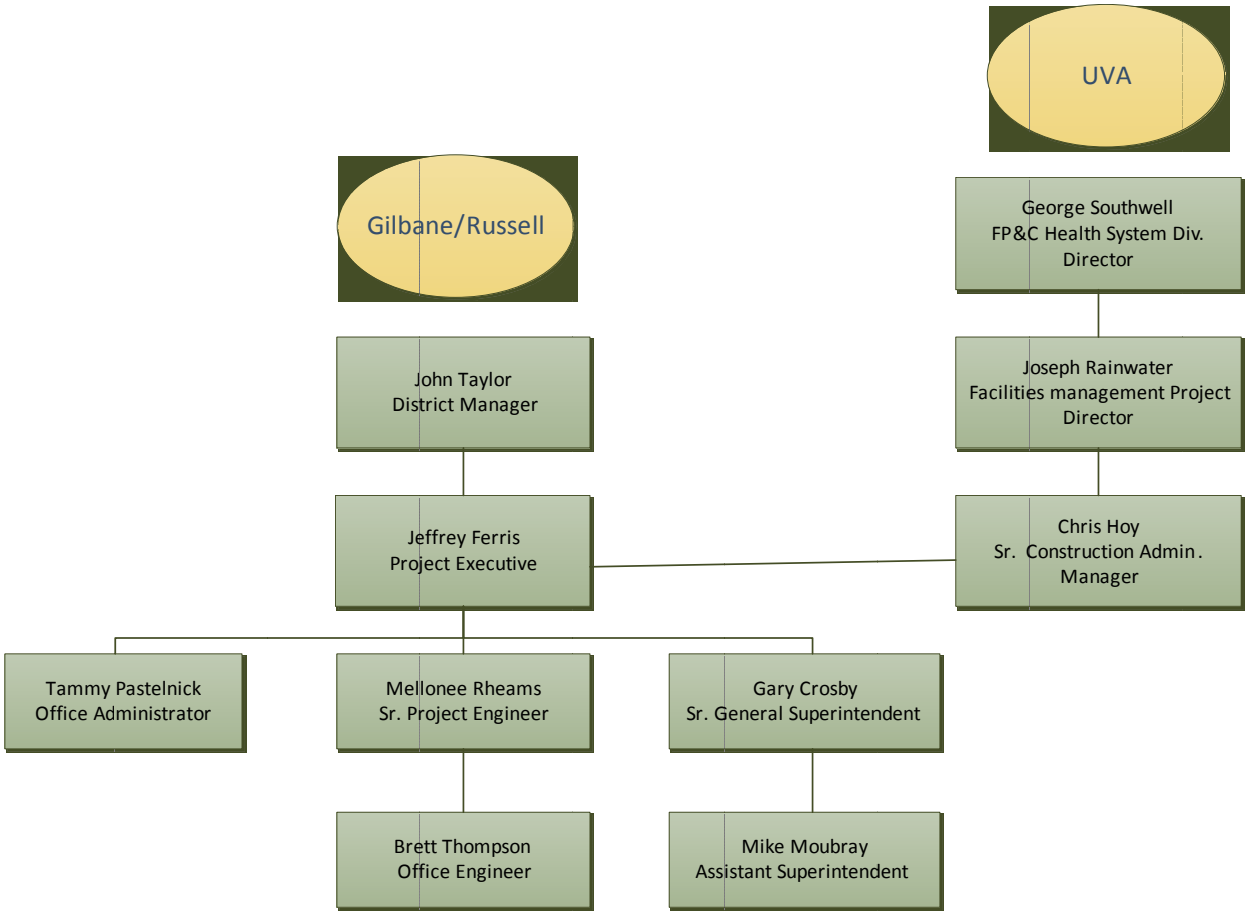
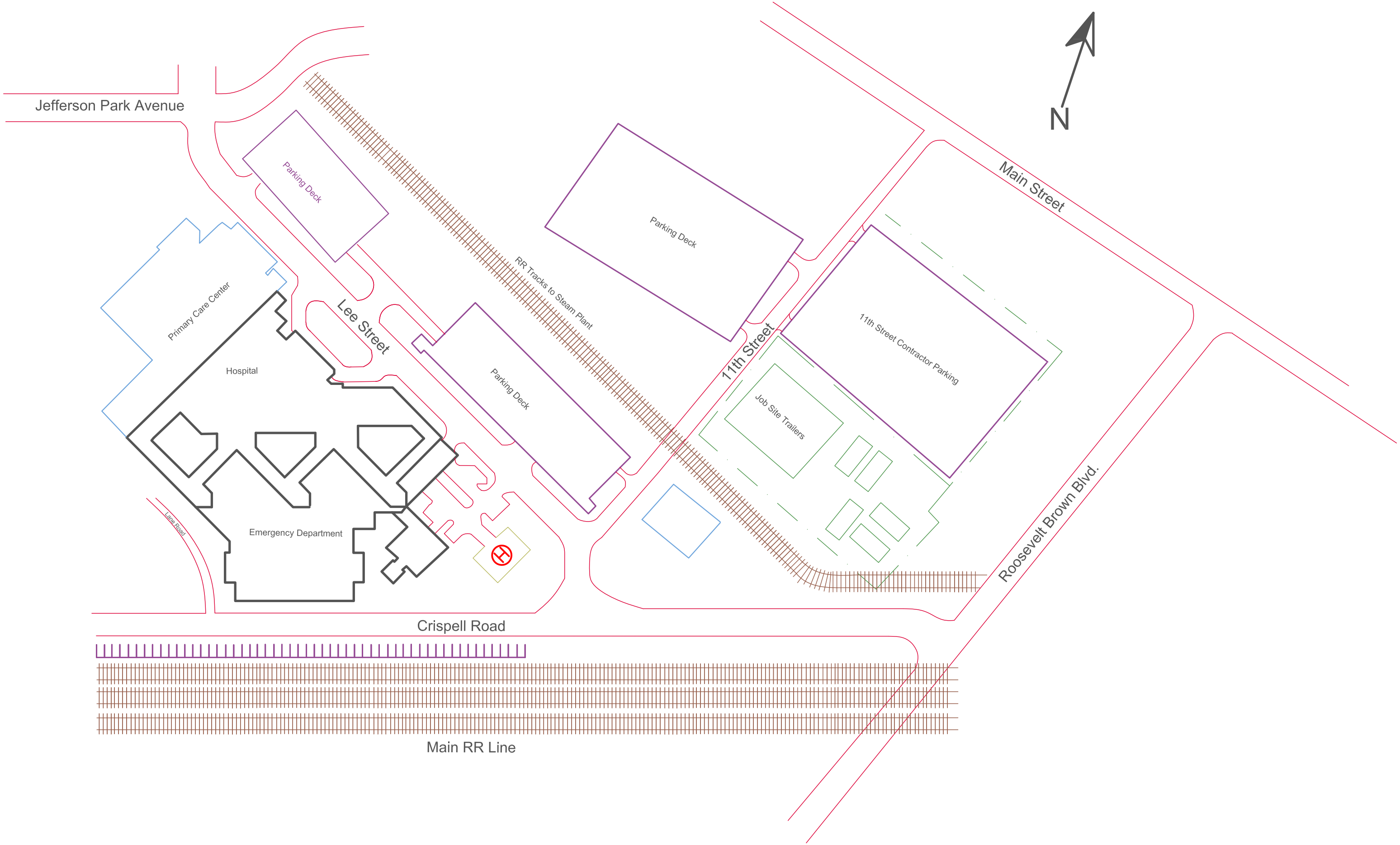
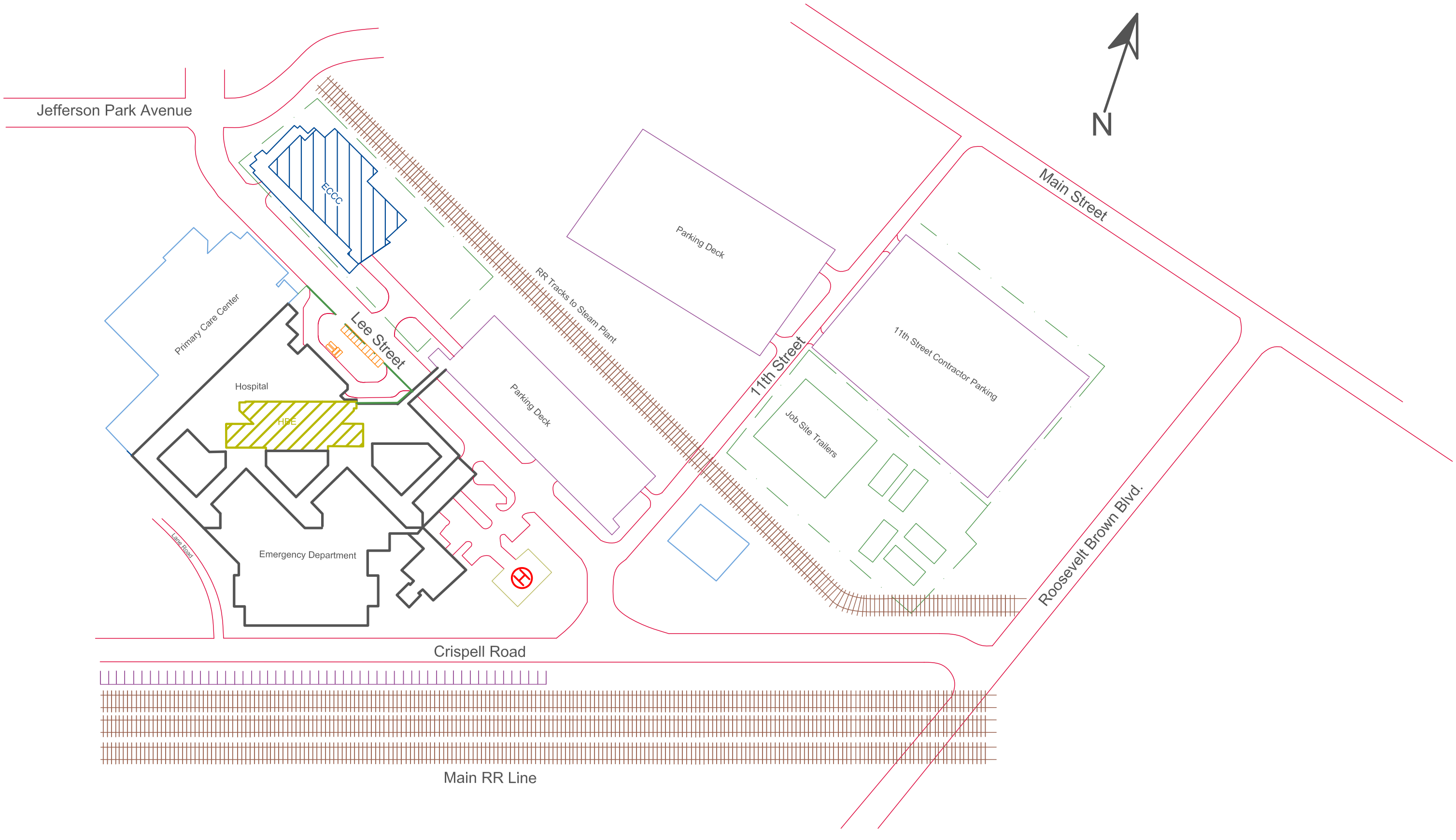


Chart 2 shows the staffing plan.


Jefferson Park Avenue
Parking Deck
Primary Care Center
Hospital
Emergency Department
Lane Road
Lee Street
RR Tracks to Steam Plant
Parking Deck
Parking Deck
11th Street
11th Street Contractor Parking
Job Site Trailers
Main Street
Roosevelt Brown Blvd.
N
Crispell Road
Main RR Line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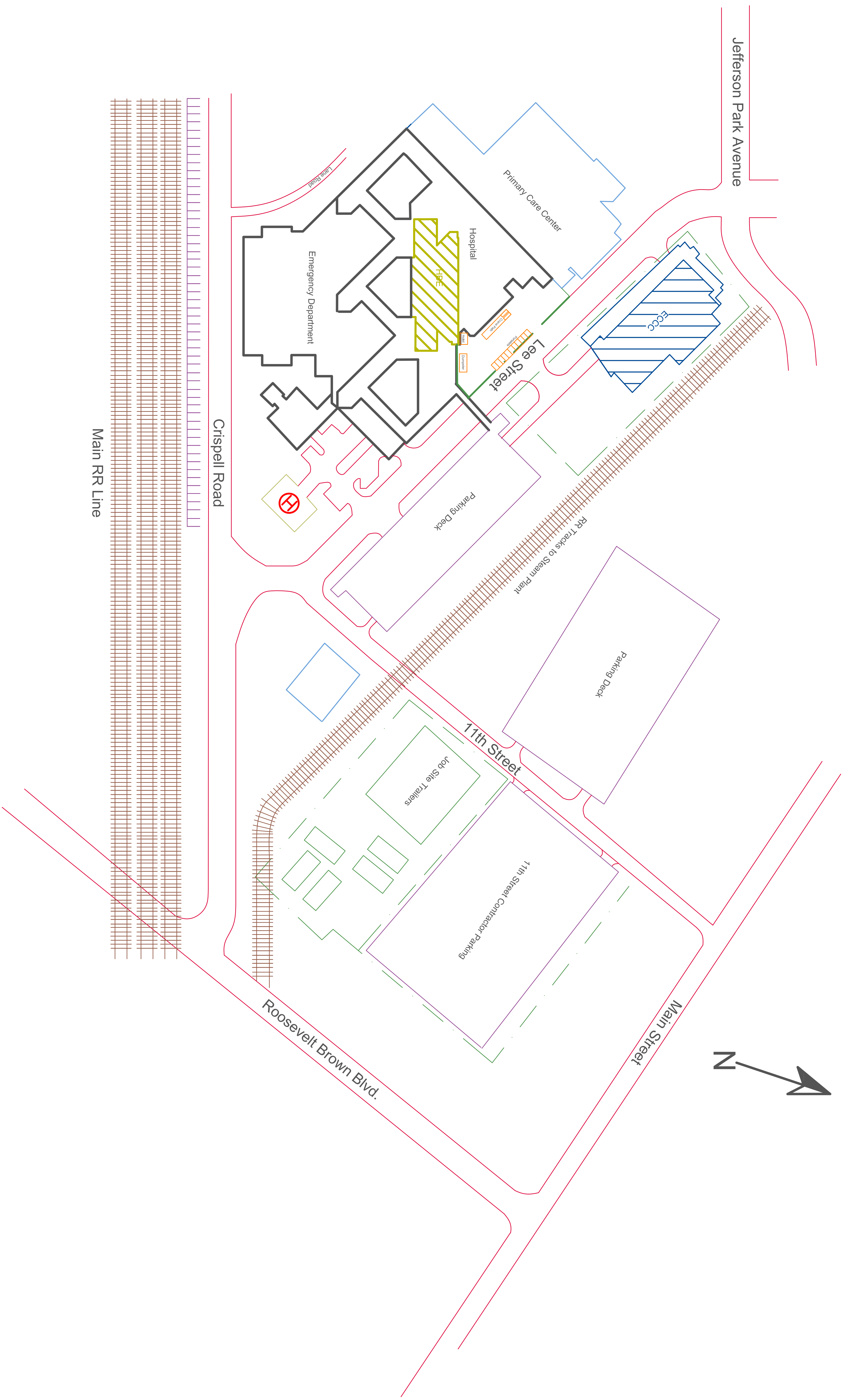
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Roosevelt Brown Blvd.
Main Street
N

Jefferson Park Avenue

ECCC

Primary Care Center

Connective Elements

RR Tracks to Steam Plant

Parking Deck

Main Street

N

Lee Street

Hospital

HRE

Dumpster

Dumpster

Parking Deck

11th Street

11th Street Contractor Parking

Job Site Trailers

Emergency Department

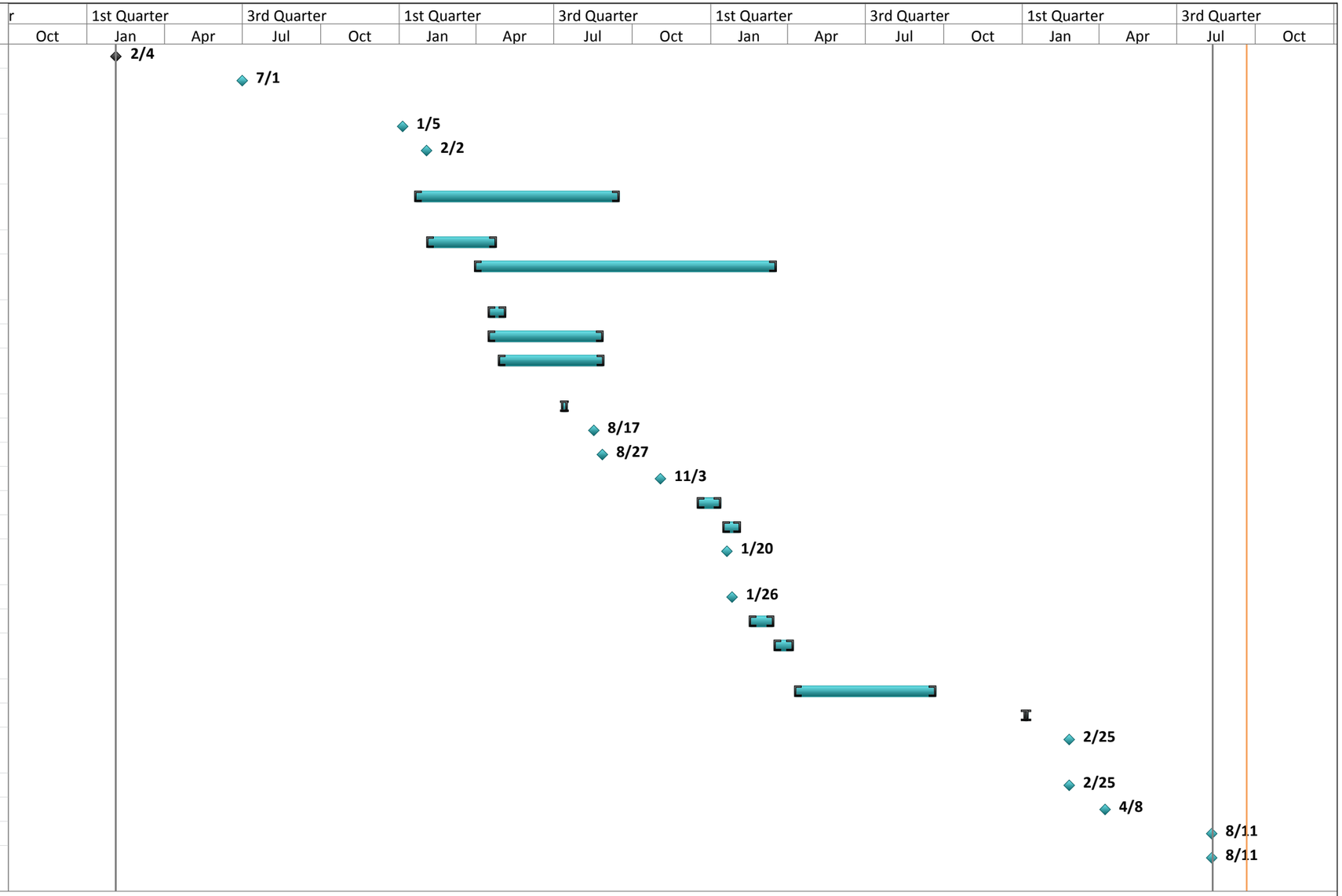
Lane Road

Roosevelt Brown Blvd.

Crispell Road

Main RR Line

ID	Task Name	Duration	Start	Finish
1	Design Phase Complete	0 days	Mon 2/4/08	Mon 2/4/08
2	Structural Steel Bought Out	0 days	Tue 7/1/08	Tue 7/1/08
3	Curtain Wall Bought Out	0 days	Mon 1/5/09	Mon 1/5/09
4	NTP for New Construction	0 days	Mon 2/2/09	Mon 2/2/09
5	Procurement of Structural Steel	172 days	Mon 1/19/09	Tue 9/15/09
6	Job Set Up	60 days	Mon 2/2/09	Fri 4/24/09
7	Procurement for Select MEP	254 days	Mon 3/30/09	Thu 3/18/10
8	Survey Elevations	15 days	Wed 4/15/09	Tue 5/5/09
9	Begin Steel Erection	97 days	Wed 4/15/09	Thu 8/27/09
10	Layout & Installation of Ductbank	90 days	Mon 4/27/09	Fri 8/28/09
11	Installation of Hoist	5 days	Fri 7/10/09	Thu 7/16/09
12	Start Curtain Wall	0 days	Mon 8/17/09	Mon 8/17/09
13	Top Out Steel	0 days	Thu 8/27/09	Thu 8/27/09
14	Finish Curtain Wall	0 days	Tue 11/3/09	Tue 11/3/09
15	Access Points	20 days	Wed 12/16/09	Tue 1/12/10
16	Field Measurements	15 days	Fri 1/15/10	Thu 2/4/10
17	Pour Out Concrete Decks	0 days	Wed 1/20/10	Wed 1/20/10
18	Watertight Building	0 days	Tue 1/26/10	Tue 1/26/10
19	Install ICRA Walls	21 days	Mon 2/15/10	Mon 3/15/10
20	Removal of Existing Curtainwall	17 days	Tue 3/16/10	Wed 4/7/10
21	Power Upgrades	118 days	Fri 4/9/10	Tue 9/21/10
22	Removal of Hoist	5 days	Mon 1/3/11	Fri 1/7/11
23	Equipment Start Up Commissioning	0 days	Fri 2/25/11	Fri 2/25/11
24	Turnover Floors 7 & 8	0 days	Fri 2/25/11	Fri 2/25/11
25	Turnover Floors 5 &6	0 days	Fri 4/8/11	Fri 4/8/11
26	Turnover Floors 4,3, & 2M	0 days	Thu 8/11/11	Thu 8/11/11
27	Projected Substantial Completion	0 days	Thu 8/11/11	Thu 8/11/11



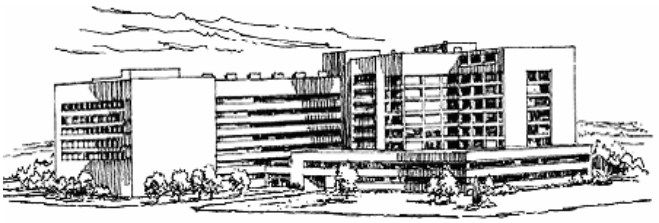
Project: HBE Thesis Schedule
Date: Wed 9/21/11

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Deadline
Split	External Tasks	Inactive Summary	Manual Summary	Progress
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

Square Foot Cost Estimate Report

Estimate Name: **HBE SF**

Building Type:	**Hospital, 4-8 Story with Precast Concrete Panels With Exposed Aggregate / Steel Frame**
Location:	National Average
Stories Count (L.F.):	**8.00**
Stories Height	**12.00**
Floor Area (S.F.):	**60,000.00**
LaborType	**Open Shop**
Basement Included:	No
Data Release:	**Year 2008 Quarter 2**
Cost Per Square Foot	**$208.00**
Total Building Cost	**$12,480,000**



Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.
Parameters are not within the ranges recommended byRSMeans.

		% of Total	Cost Per SF	Cost
A Substructure		**2.2%**	**4.42**	**$265,000**
A1010	**Standard Foundations**		**3.02**	**$181,500**
	Strip footing, concrete, reinforced, load 44.0 KLF, soil bearing capacity 6 KSF, 24" deep x 96" wide			
	Spread footings, 3000 PSI concrete, load 400K, soil bearing capacity 6 KSF, 8' - 6" square x 27" deep			
	Spread footings, 3000 PSI concrete, load 500K, soil bearing capacity 6 KSF, 9' - 6" square x 30" deep			
	Spread footings, 3000 PSI concrete, load 600K, soil bearing capacity 3 KSF, 16' - 0" square x 35" deep			
	Spread footings, 3000 PSI concrete, load 600K, soil bearing capacity 6 KSF, 10' - 6" square x 33" deep			
	Spread footings, 3000 PSI concrete, load 800K, soil bearing capacity 3 KSF, 18' - 0" square x 39" deep			
A1030	**Slab on Grade**		**0.81**	**$48,500**
	Slab on grade, 6" thick, light industrial, reinforced			
A2010	**Basement Excavation**		**0.02**	**$1,000**
	Excavate and fill, 30,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**0.57**	**$34,000**
	Foundation wall, CIP, 4' wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick			
B Shell		**23.0%**	**46.00**	**$2,760,000**
B1010	**Floor Construction**		**15.62**	**$937,500**
	Steel column, W10, 200 KIPS, 10' unsupported height, 45 PLF			
	Floor, composite metal deck, shear connectors, 5.5" slab, 30'x30' bay, 26.5" total depth, 75 PSF superimposed load,			
	Fireproofing, gypsum board, fire rated, 2 layer, 1" thick, 10" steel column, 3 hour rating, 17 PLF			
B1020	**Roof Construction**		**0.94**	**$56,500**
	Floor, steel joists, beams, 1.5" 22 ga metal deck, on columns, 30'x30' bay, 28" deep, 40 PSF superimposed load, 62			
B2010	**Exterior Walls**		**18.72**	**$1,123,500**
	Exterior wall, precast concrete, flat, 8" thick, 10' x 10', white face, 2" rigid insulation, low rise			
B2020	**Exterior Windows**		**9.05**	**$543,000**
	Windows, aluminum, sliding, insulated glass, 5' x 3'			
B2030	**Exterior Doors**		**0.63**	**$38,000**
	Door, aluminum & glass, with transom, full vision, double door, hardware, 6'-0" x 10'-0" opening			
	Door, aluminum & glass, with transom, non-standard, double door, hardware, 6'-0" x 10'-0" opening			

		% of Total	Cost Per SF	Cost
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening			
B3010	**Roof Coverings**		**1.00**	**$60,000**
	Roofing, single ply membrane, reinforced, PVC, 48 mils, fully adhered, adhesive			
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite			
	Roof edges, aluminum, duranodic, .050" thick, 6" face			
	Flashing, copper, no backing, 16 oz, < 500 lbs			
B3020	**Roof Openings**		**0.02**	**$1,500**
	Roof hatch, with curb, 1" fiberglass insulation, 2'-6" x 3'-0", galvanized steel, 165 lbs			
C Interiors		**20.2%**	**40.31**	**$2,418,500**
C1010	**Partitions**		**6.80**	**$408,000**
	Metal partition, 5/8" vinyl faced gypsum board face, 5/8"fire rated gypsum board base, 3-5/8" @ 24",s ame opposite			
	Gypsum board, 1 face only, 5/8" with 1/16" lead			
C1020	**Interior Doors**		**9.33**	**$560,000**
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"			
	Door, single leaf, kd steel frame, metal fire, commercial quality, 3'-0" x 7'-0" x 1-3/8"			
C1030	**Fittings**		**0.90**	**$54,000**
	Partitions, hospital curtain, ceiling hung, poly oxford cloth			
C2010	**Stair Construction**		**1.22**	**$73,500**
	Stairs, steel, cement filled metal pan & picket rail, 12 risers, with landing			
C3010	**Wall Finishes**		**6.66**	**$399,500**
	Glazed coating			
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats			
	Vinyl wall covering, fabric back, medium weight			
	Ceramic tile, thin set, 4-1/4" x 4-1/4"			
C3020	**Floor Finishes**		**9.18**	**$550,500**
	Composition flooring, epoxy terrazzo, maximum			
	Terrazzo, maximum			
	Vinyl, composition tile, maximum			
	Tile, ceramic natural clay			
C3030	**Ceiling Finishes**		**6.22**	**$373,000**
	Plaster ceilings, 3 coat prl, 3.4# metal lath, 3/4" crc, 12"OC furring, 1-1/2" crc, 36" OC support			
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support			
D Services		**47.3%**	**94.51**	**$5,670,500**
D1010	**Elevators and Lifts**		**5.35**	**$321,000**
	Traction, geared hospital, 6000 lb, 6 floors, 12' story height, 2 car group, 200 FPM			
D2010	**Plumbing Fixtures**		**5.88**	**$352,500**
	Water closet, vitreous china, bowl only with flush valve, wall hung			
	Urinal, vitreous china, stall type			
	Lavatory w/trim, wall hung, PE on CI, 19" x 17"			
	Kitchen sink w/trim, raised deck, PE on CI, 42" x 21" dual level, triple bowl			
	Laundry sink w/trim, PE on CI, black iron frame, 48" x 21" double compartment			
	Service sink w/trim, PE on CI, corner floor, wall hung w/rim guard, 22" x 18"			
	Bathtub, recessed, PE on CI, mat bottom, 5'-6" long			
	Shower, stall, baked enamel, terrazzo receptor, 36" square			
	Water cooler, electric, wall hung, wheelchair type, 7.5 GPH			
D2020	**Domestic Water Distribution**		**15.22**	**$913,500**
	Electric water heater, commercial, 100< F rise, 1000 gal, 480 KW 1970 GPH			
D2040	**Rain Water Drainage**		**1.58**	**$94,500**
	Roof drain, CI, soil,single hub, 5" diam, 10' high			
	Roof drain, CI, soil,single hub, 5" diam, for each additional foot add			

		% of Total	Cost Per SF	Cost
D3010	**Energy Supply**		**2.85**	**$171,000**
	Hot water reheat system for 200,000 SF hospital			
D3020	**Heat Generating Systems**		**0.33**	**$20,000**
	Boiler, electric, steel, steam, 510 KW, 1,740 MBH			
D3030	**Cooling Generating Systems**		**2.52**	**$151,500**
	Chiller, reciprocating, water cooled, standard controls, 100 ton			
	Chiller, reciprocating, water cooled, standard controls, 150 ton			
	Chiller, reciprocating, water cooled, standard controls, 200 ton			
D3090	**Other HVAC Systems/Equip**		**24.12**	**$1,447,500**
	Ductwork for 200,000 SF hospital model			
	Boiler, cast iron, gas, hot water, 2856 MBH			
	Boiler, cast iron, gas, hot water, 320 MBH			
	AHU, rooftop, cool/heat coils, VAV, filters, 5,000 CFM			
	AHU, rooftop, cool/heat coils, VAV, filters, 10,000 CFM			
	AHU, rooftop, cool/heat coils, VAV, filters, 20,000 CFM			
	VAV terminal, cooling, hot water reheat, with actuator / controls, 200 CFM			
	AHU, rooftop, cool/heat coils, VAV, filters, 30,000 CFM			
	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 1500 CFM			
	Roof vent. system, power, centrifugal, aluminum, galvanized curb, back draft damper, 2750 CFM			
	Commercial kitchen exhaust/make-up air system, rooftop, gas, 5000 CFM			
	Plate heat exchanger, 400 GPM			
D4010	**Sprinklers**		**1.89**	**$113,500**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF			
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 10,000 SF			
D4020	**Standpipes**		**0.82**	**$49,000**
	Wet standpipe risers, class III, steel, black, sch 40, 4" diam pipe, 1 floor			
	Wet standpipe risers, class III, steel, black, sch 40, 4" diam pipe, additional floors			
	Cabs, hose rack assembly, & extinguisher, 2-1/2" x 1-1/2" valve & hose, steel door & frame			
	Alarm, electric pressure switch (circuit closer)			
	Escutcheon plate, for angle valves, polished brass, 2-1/2"			
	Fire pump, electric, with controller, 5" pump, 100 HP, 1000 GPM			
	Fire pump, electric, for jockey pump system, add			
	Siamese, with plugs & chains, polished brass, sidewalk, 4" x 2-1/2" x 2-1/2"			
	Valves, angle, wheel handle, 300 lb, 2-1/2"			
	Cabinet assembly, includes. adapter, rack, hose, and nozzle			
D5010	**Electrical Service/Distribution**		**12.27**	**$736,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 2000 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 2000 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 2000 A			
D5020	**Lighting and Branch Wiring**		**16.09**	**$965,500**
	Receptacles incl plate, box, conduit, wire, 20 per 1000 SF,2.4 W per SF, with transformer			
	Wall switches, 5.0 per 1000 SF			
	Miscellaneous power, 1.2 watts			
	Central air conditioning power, 4 watts			
	Motor installation, three phase, 460 V, 15 HP motor size			
	Motor feeder systems, three phase, feed to 200 V 5 HP, 230 V 7.5 HP, 460 V 15 HP, 575 V 20 HP			
	Fluorescent fixtures recess mounted in ceiling, 1 watt per SF, 20 FC, 5 fixtures @40 watts per 1000 SF			
D5030	**Communications and Security**		**1.60**	**$96,000**
	Communication and alarm systems, includes outlets, boxes, conduit and wire, fire detection systems, 100 detectors			
	Internet wiring, 8 data/voice outlets per 1000 S.F.			

		% of Total	Cost Per SF	Cost
D5090	**Other Electrical Systems**		**3.98**	**$239,000**
	Generator sets, w/battery, charger, muffler and transfer switch, diesel engine with fuel tank, 100 kW			
	Generator sets, w/battery, charger, muffler and transfer switch, diesel engine with fuel tank, 400 kW			
	Uninterruptible power supply with standard battery pack, 15 kVA/12.75 kW			
E Equipment & Furnishings		**7.4%**	**14.77**	**$886,000**
E1020	**Institutional Equipment**		**11.12**	**$667,500**
	Architectural equipment, laboratory equipment glassware washer, distilled water, economy			
	Architectural equipment, sink, epoxy resin, 25" x 16" x 10"			
	Architectural equipment, laboratory equipment eye wash, hand held			
	Fume hood, complex, including fixtures and ductwork			
	Architectural equipment, medical equipment sterilizers, floor loading, double door, 28"x67"x52"			
	Architectural equipment, medical equipment, medical gas system for large hospital			
	Architectural equipment, kitchen equipment, commercial dish washer, semiautomatic, 50 racks/hr			
	Architectural equipment, kitchen equipment, food warmer, counter, 1.65 KW			
	Architectural equipment, kitchen equipment, kettles, steam jacketed, 20 gallons			
	Architectural equipment, kitchen equipment, range, restaurant type, burners, 2 ovens & 24" griddle			
	Architectural equipment, kitchen equipment, range hood, including CO2 system, economy			
	Special construction, refrigerators, prefabricated, walk-in, 7'-6" high, 6' x 6'			
	Architectural equipment, darkroom equipment combination, tray & tank sinks, washers & dry tables			
E1090	**Other Equipment**		**0.00**	**$0**
E2020	**Moveable Furnishings**		**3.64**	**$218,500**
	Furnishings, hospital furniture, patient wall system, no utilities, deluxe , per room			
F Special Construction		**0.0%**	**0.00**	**$0**
G Building Sitework		**0.0%**	**0.00**	**$0**
Sub Total		**100%**	**$200.00**	**$12,000,000**
Contractor's Overhead & Profit		**0.0%**	**$0.00**	**$0**
Architectural Fees		**4.0%**	**$8.00**	**$480,000**
User Fees		**0.0%**	**$0.00**	**$0**
Total Building Cost			**$208.00**	**$12,480,000**

The Rector and Visitors of the University of Virginia

Cost Plus Fee

Lump Sum

Gilbane Building Company
CM Agent
Jeffrey Ferris

UVA Facilities Management
CM
Chris Hoy

Smithgroup Inc.
Architect
Bob Nashed

Design-Bid-Build
Lump Sum

Fireproofing
American Coatings Corp

Misc. Metals
Atlantic Contractors, Inc.

General Trades
Artisan

Resilient Flooring
Bonitz Flooring Group, Inc.

Painting
E. Caligari and Son

Glass and Glazing
Charlottesville Glass & Mirror

Drywall/Ceiling
Commercial Interiors

Ceramic Tile
DMA Floors

Sitework
Faulconer Construction

Electrical
Design Electric

Surveying
Hurt & Profitt

Concrete
Piedmont Concrete

Mechanical
Riddleberger Brother

Roofing
SouthEastern Roofing

Steel
SteelFab

Architectural Woodworking
Martin Horn, Inc.

Architectural Specialties
R.E. Lee & Sons

Demolition
SCR

Metal Siding & Wall Panels
Ridgeview Glass

Elevators
Virginia Elevator

Design-Build
Cost Plus Fee

Site/Civil Engineer
Dewberry

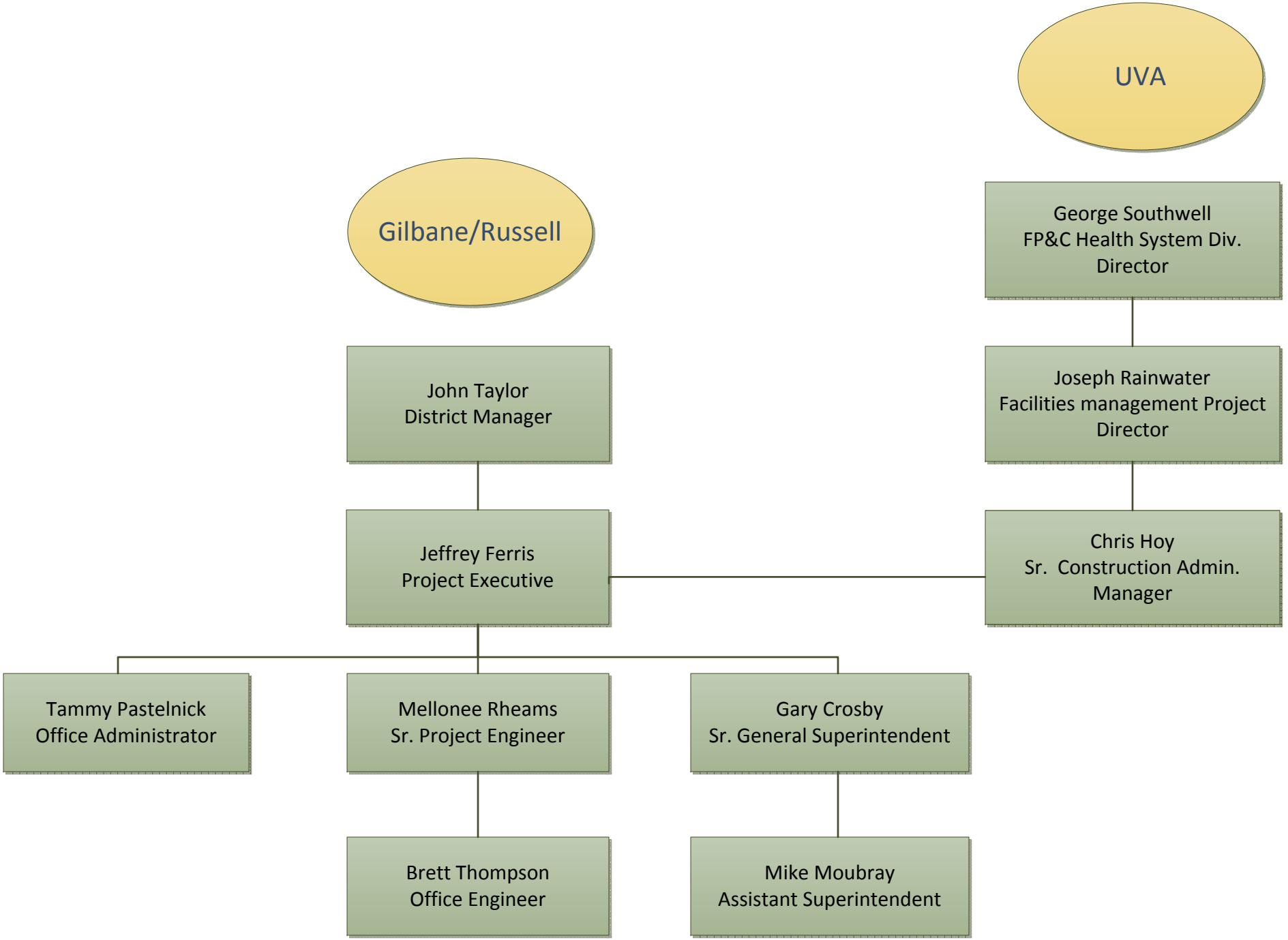
Architectural Specifications
Heller & Metzger PC

Acoustical Consultant
Miller, Beam & Paganelli, Inc

Fire Protection Engineers
Koffel Associates Inc.

MEP Engineers
AKF Engineers

Structural Engineers
Spiegel Zamecnik & Shah Inc.


UVA
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FP&C Health System Div.
Director
John Taylor
District Manager
Joseph Rainwater
Facilities management Project
Director
Jeffrey Ferris
Project Executive
Chris Hoy
Sr. Construction Admin.
Manager
Tammy Pastelnick
Office Administrator
Mellonee Rheams
Sr. Project Engineer
Gary Crosby
Sr. General Superintendent
Brett Thompson
Office Engineer
Mike Moubray
Assistant Superintendent