

DANIEL ALEXANDER | CM | DR. MESSNER



TECHNICAL REPORT 1

DOCTORS COMMUNITY HOSPITAL
LANHAM, MD

SEPTEMBER 29, 2008



PROJECT TEAM

- OWNER: DOCTORS COMMUNITY HOSPITAL
- CM: GILBANE BUILDING COMPANY
- ARCHITECT: CR GOODMAN ASSOCIATES
- STRUCTURAL: MINCIN-PATEL-MILANO
- MECH & ELECTRICAL: LEACH WALLACE ASSOCIATES

STRUCTURE

- STEEL COLUMNS AND BEAMS BUILT UP ON EXISTING STEEL CONSTRUCTION
- CONCRETE FOOTERS WITH GRADE BEAMS (~50% EXISTING, 50% NEW)
- LIGHTWEIGHT CONCRETE ON METAL DECK TO FORM COMPOSITE SLAB
- NON-LOAD BEARING BRICK ON METAL STUD FACADE

MECHANICAL

- ROOF MOUNTED MECHANICAL PLANT
- 90,000 CFM AIR HANDLER FEEDING VAV BOXES
- 425 TON CHILLER
- DRAW THROUGH 425 TON COOLING TOWER
- (3) 2,678 MBH DUEL FUEL BOILERS
- MEDICAL GAS AND VACUUM TUBES FEED EACH PATIENT ROOM

PROJECT OVERVIEW

- FUNCTION: MEDICAL HOSPITAL
- SIZE: 270,000 SF EXPANSION
- COST: \$42 MILLION
- DELIVERY: DESIGN-BID-BUILD WITH A GMP FROM A CM@RISK
- OCCUPANT: DOCTORS COMMUNITY HOSPITAL
- DATES: NOV '07- MARCH '10

ELECTRICAL/LIGHTING

- 1,200 AMP SWITCHGEAR
- (2) 2,500 AMP SWITCHBOARDS
- 1,250 KVA EMERGENCY GENERATOR FED BY 5,000 GAL FUEL TANK
- POWER FED VERTICALLY THROUGH STACKED ELECTRICAL ROOMS WITH MULTIPLE TRANSFORMERS IN EACH
- LIGHTING TYPICALLY CONSISTS OF RECESSED 2x4 FLUORESCENT LIGHTS

SPECIAL CONSIDERATIONS

- CONSTRUCTION IS OCCURRING DIRECTLY ABOVE AND ADJACENT TO AN OPERATIONAL HOSPITAL. OUTAGES MUST BE COORDIANATED WITH OWNER, AND SPECIAL DUST AND DEBRIS CONTROL IS NEEDED IN RENOVATION PORTIONS

ARCHITECTURE

- PATIENT ROOMS ARRANGED ON THE OUTSIDE WITH SUPPORT AREAS IN THE CENTER
- BRICK FACADE WITH SPLIT-FACE CMU BANDING AND CAST STONE WINDOW LINTELS
- ROOF: BUILT UP STYRENE-BITUMEN-STYRENE SYSTEM ON 3" POLYSTYRENE FOAM

DANIEL ALEXANDER | CONSTRUCTION MANGEMENT

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EXECUTIVE SUMMARY

TECHNICAL REPORT 1 FOR THE DOCTORS COMMUNITY HOSPITAL IN LANHAM, MD EXAMINES THE SCHEDULE, COSTS, AND SYSTEMS EMPLOYED BY GILBANE CONSTRUCTION AND THE OWNER, DCH.

DCH COMMISSIONED THE PROJECT IN ORDER TO EXPAND ITS FACILITY TO BETTER SERVE THE NEEDS OF THE REGION. AN 18 MONTH DESIGN PHASE TRANSITIONED INTO A 28 MONTH CONSTRUCTION SCHEDULE SLATED FOR GROUND BREAKING IN NOVEMBER 2007, WITH PHASE 1 FINISHING IN FEBRUARY '09, PHASE 2 WRAPPING UP IN SEPTEMBER '09 AND THE FINAL PHASE COMPLETED IN MARCH '10. A UNIQUE ASPECT OF THIS PROJECT IS IT IS NOT ITS OWN STANDALONE WING WITH ONE OR TWO CONNECTION POINTS TO THE EXISTING STRUCTURE, BUT RATHER AN EXTENSION OF AN EXISTING TOWER, AND AN OVERBUILD ON TOP OF A TWO STORY EXISTING STRUCTURE. THE HOSPITAL IS EXPECTED TO MAINTAIN FULL FUNCTIONALITY DURING CONSTRUCTION, WHICH CAN IMPACT SCHEDULE AND PRODUCTIVITY IF CERTAIN PRECAUTIONS ARE NOT TAKEN.

THE BUILDING IS TO HOUSE A 5 STORY PATIENT TOWER, EXPAND THE 1ST FLOOR EMERGENCY DEPARTMENT, AND CREATE SECOND FLOOR SHELL SPACE (FITOUT YET TO BE DETERMINED). BRICK ON METAL STUD WAS THE FAÇADE OF CHOICE FOR THIS STRUCTURE. IT WILL HAVE A STANDALONE MECHANICAL PLANT PLACED ON THE ROOF AND ELECTRICAL SERVICE WILL BE FED OFF OF EXISTING SWITCHBOARDS. N+1 REDUNDANCY WILL BE INCORPORATED IN THE FORM OF A 1000 KW DIESEL GENERATOR.

GILBANE HAS BEEN CONTRACTED AS THE CM @ RISK FOR THIS PROJECT UNDER A GMP. THEY WERE BROUGHT ON EARLY IN THE PROJECT FOR CONSTRUCTABILITY REVIEWS AND INITIAL SCHEDULE ANALYSES.

PROJECTED COSTS AT THE START OF THE ENDEAVOR TOTALED ROUGHLY \$31 MILLION. BUT THROUGH A CHANGE ORDER FOR ADDED SCOPE (THE 1ST FLOOR FITOUT) THE CURRENT TOTAL IS ROUGHLY \$35 MILLION WITH MORE ADDED SCOPE (THE 2ND FLOOR FITOUT) STILL EXPECTED.

THE SITE IS EXTREMELY CONGESTED, AND WILL POSE AN OBSTACLE THROUGHOUT THE PROJECT. THIS AREA IS ONE WHICH MAY WARRANT FOCUS FOR A THESIS TOPIC. THE OWNER ACTUALLY PASSED UP THE OPPORTUNITY TO BUY ADJACENT LAND AND THIS MAY BE WORTH INVESTIGATING THE IMPACTS IN TERMS OF SCHEDULE AND COST.

PROJECT SCHEDULE SUMMARY

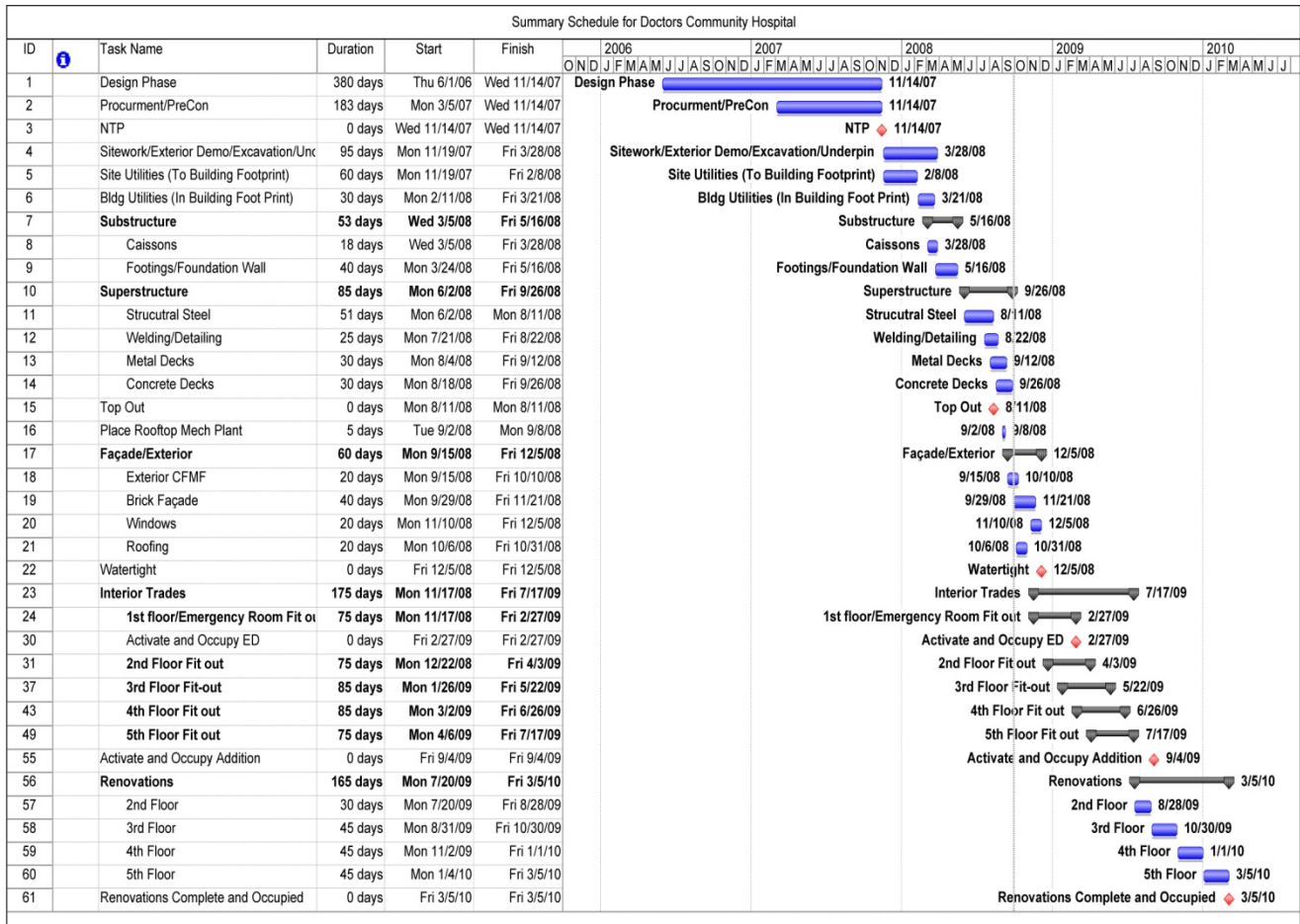
THE SCHEDULE FOR DCH IS RELATIVELY STRAIGHT FORWARD IN ITS NATURE. THE SUMMARY GANTT CHART IS SHOWN ON THE NEXT PAGE IN FIGURE 1. DESIGN PHASE ACTIVITIES LASTED ROUGHLY 17-18 MONTHS, WHICH ACCORDING TO THE GILBANE APM, IS AVERAGE FOR A MEDIUM SIZE HOSPITAL EXPANSION. THE NTP CAME IN NOVEMBER OF 2007, WHICH HAD SITEWORK AND EXCAVATION BEING COMPLETED IN THE MIDDLE OF A MARYLAND WINTER. WHILE NOT ALWAYS HEAVY WITH SNOWFALL, THE WEATHER DOES TEND TO BE SUBPAR WORKING CONDITIONS BETWEEN THE SNOW AND RAIN WHICH CAN HURT PRODUCTIVITY.

SUBSTRUCTURE WORK IS SET TO BEGIN IN MARCH OF 2008, ONCE WEATHER HAS CALMED DOWN AND BEGINS BEING MORE FAVORABLE FOR CONSTRUCTION, ALTHOUGH CAN RUN THE RISK OF A RAINY SPRING SEASON. THE SUBSTRUCTURE FINISHES OUT IN THE MIDDLE OF MAY, ALLOWING THE SUPERSTRUCTURE TO START. STEEL ERECTION BEGINS JUNE 2ND, RIGHT AT THE START OF SUMMER, WHICH ASIDE FROM BEING HOT AND HUMID IN MARYLAND, THE WEATHER GENERALLY WILL BE AMENABLE TO CRANE OPERATION AND STEEL PLACEMENT. CONCRETE DECKS WILL BE FOLLOWING BEHIND THE METAL DECK, AND IN THIS HEAT EXTRA CARE WILL NEED TO BE TAKEN TO KEEP THE CONCRETE USABLE BY MIXING WITH ICE TO STAY AT AN ACCEPTABLE TEMPERATURE AND ENSURE PROPER CURING.

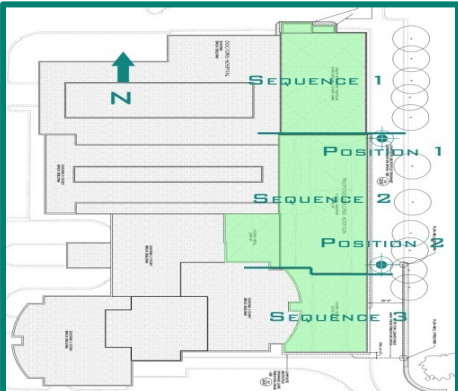
THE BUILDING BECOMES WATER TIGHT AT THE VERY BEGINNING OF DECEMBER AT WHICH POINT UTILITY TRADES CAN BEGIN THEIR WORK. MECHANICAL, HAVING ALREADY SET THE ROOF TOP MECHANICAL PLANT IN PLACE BEGINS FROM THE BOTTOM UP WITH THE REST OF THEIR ROUGH-IN. THEY ARE FOLLOWED BY ELECTRICAL, PLUMBING, AND SPRINKLER TRADES AND LASTLY THE INTERIOR PARTITIONS AND OTHER FINISH TRADES.

THREE PHASED OCCUPANCIES ARE INVOLVED IN THIS SCHEDULE. FIRST, THE EMERGENCY DEPARTMENT EXPANSION NEEDS TO BE AVAILABLE BY THE END OF FEBRUARY '09 DUE TO OWNER REQUESTS. THE REMAINDER OF THE EXPANSION WILL BE ONLINE BY EARLY SEPTEMBER '09. RENOVATIONS ARE SLATED TO BEGIN AT THIS TIME WITH EACH FLOOR BEING COMPLETED ONE AT A TIME, AND ALL RENOVATIONS ARE FINISHED BY MARCH '10.

FIGURE 1- DOCTOR'S COMMUNITY HOSPITAL SUMMARY SCHEDULE



BUILDING SYSTEMS SUMMARY

SCOPE OF WORK	SUMMARY FEATURES
<p>DEMOLITION</p>	<ul style="list-style-type: none"> ● DEMOLITION OCCURS IN TWO MAIN PHASES <ul style="list-style-type: none"> ○ EXTERIOR PREP- TO READY EXISTING SITE AND PORTIONS OF EXISTING FAÇADE FOR NEW STRUCTURE (BRICK AND ASPHALT) ○ INTERIOR RENOVATIONS- AS THE 2ND THROUGH 5TH FLOORS IN THE EXISTING STRUCTURE ARE RENOVATED (DRYWALL, CASEWORK, PARTITIONS, LIMITED CONCRETE DECK FILL) ● ASBESTOS AND LEAD PAINT ABATEMENT IS EXPECTED IN THE INTERIOR PORTION OF RENOVATIONS. AS OF YET, QUANTITY IS UNDEFINED FOR BOTH. (ORIGINAL CONSTRUCTION IN 1970'S) <ul style="list-style-type: none"> ○ EXPECTING TO FIND ASBESTOS IN EXISTING PIPE INSULATION ○ EXPECTING LEAD PAINT IN MOST/ALL PAINTED ROOMS ○ CONTRACTOR IS EXPECTED TO REMOVE ANY ASBESTOS ENCOUNTERED, EVEN IF IT IS NOT FRIABLE ● CONTRACTOR TO SALVAGE EXISTING HOSPITAL ITEMS IN RENOVATION AREA AS DIRECTED BY OWNER. CONTRACTOR IS RESPONSIBLE FOR ALL SALVAGED MATERIAL UNTIL REINSTALLED.
<p>STRUCTURAL STEEL</p>	<ul style="list-style-type: none"> ● W-SHAPE COLUMNS AND BEAMS PLACED ON CONCRETE FOOTERS <ul style="list-style-type: none"> ○ SIZE RANGE W8x30 TO W12x170 ○ PLACED FROM NORTH TO SOUTH VIA A 130 TON TRUCK CRANE ○ THE CRANE USES TWO LOCATIONS AS SHOWN IN FIGURE 2 BELOW. <p>FIGURE 2- CRANE LOCATION FOR STEEL ERECTION</p> 

SCOPE OF WORK	SUMMARY FEATURES
	<ul style="list-style-type: none"> ● COMPOSITE SLAB ON METAL DECK WITH SHEAR STUDS <ul style="list-style-type: none"> ○ LIGHTWEIGHT CONCRETE 5" SLAB (3 1/2" TOPPING SLAB ON 1/2" METAL DECK) ○ 6X6X8/8 WWM TYPICAL THROUGHOUT FOR DECK REINFORCEMENT ● MOMENT RESISTANCE: 6 K-FRAMES LOCATED AT 6 DIFFERENT COLUMN LINES DOWN CENTER OF BUILDING <ul style="list-style-type: none"> ○ FULL PENETRATION MOMENT WELDS AT GIRDERS TYING INTO THESE FRAMING UNITS
<p>CAST IN PLACE CONCRETE</p>	<ul style="list-style-type: none"> ● CAISSONS, COLUMN FOOTERS, FOUNDATION WALLS, SLAB ON GRADE, CONCRETE ON METAL DECK ● DRILLED CAISSONS BEING USED DOWN TO A DEPTH OF 50' AT 11 LOCATIONS <ul style="list-style-type: none"> ○ NO FORMWORK USED; DRILLED AND PLACED DIRECT INTO GROUND (GROUND IS FORMWORK) ○ PLACED VIA PUMP ○ 4000 PSI ○ (14) #11 REBAR REINFORCING WITH #3 RING TIES 12" O.C. FOR LENGTH OF CAISSON ● FOUNDATION WALLS AND FOOTERS <ul style="list-style-type: none"> ○ FORMWORK <ul style="list-style-type: none"> ▪ FOOTERS- OCCASIONAL USE OF STICK BUILT FORM WORK. OFTEN USED GROUND AS FORM WORK. ▪ FOUNDATION WALL- REUSABLE, PREFABRICATED FORM WORK ○ PLACEMENT <ul style="list-style-type: none"> ▪ FOOTERS- DIRECT CHUTE ▪ FOUNDATION WALL- PUMP ○ 3000 PSI ○ REINFORCEMENT RANGES FROM #3-#12 DEPENDING ON LOCATION ● SLAB ON GRADE <ul style="list-style-type: none"> ○ 2X EDGE FORMWORK ○ PLACED VIA DIRECT CHUTE ○ 4000 PSI CONCRETE ON 4" CRUSHED GRAVEL FILL AND VAPOR BARRIER ○ 6X6X8/8 WWM REINFORCEMENT ● CONCRETE ON METAL DECK <ul style="list-style-type: none"> ○ POUR STOPS INCORPORATED IN STEEL WORK ○ PLACED VIA PUMP ○ 4000 PSI

SCOPE OF WORK	SUMMARY FEATURES
<p>MECHANICAL SYSTEMS</p>	<ul style="list-style-type: none"> ● MECHANICAL PLANT FOR ALL AIR SYSTEM LOCATED ON ROOF <ul style="list-style-type: none"> ○ CHILLER, BOILERS, COOLING TOWER, AHU <ul style="list-style-type: none"> ▪ ALL EXTREMELY LARGE; MUST BE CRANED IN TO PLACE ▪ AHU TO BE FABRICATED AND DELIVERED IN 5 PIECES ○ AHU FED BY CHILLED AND HOT WATER LOOPS ● TWO MECHANICAL SHAFTS USED FOR DISTRIBUTION <ul style="list-style-type: none"> ○ ONE AT NORTH END, ONE AT SOUTH END ○ ADDITIONAL ISOLATION EXHAUST AIR FROM SELECTED ROOMS AT ENDS OF WINGS ON NORTH END. <ul style="list-style-type: none"> ▪ HIGH PRESSURE EXHAUST DUCTWORK ○ VAV'S (SOME WITH REHEAT) ARE USED THROUGHOUT THE FACILITY ○ LINEAR RADIANT HEATING PANELS ARE INCORPORATED AT ALL WINDOWS IN THE PATIENT ROOMS ● MEDICAL GAS, VACUUM (FED FROM ROOFTOP COMPRESSORS) & OXYGEN (FED FROM ON SITE OXYGEN PLANT) LINES FEED EACH PATIENT ROOM ● EACH PATIENT ROOM HAS PRIVATE RESTROOMS ● FIRE SUPPRESSION <ul style="list-style-type: none"> ○ EXPANDED SPRINKLER SYSTEM INTO ADDITION ○ WET TYPE, ZONE ACTIVATED (4 ZONES PER FLOOR) ○ STANDPIPES AT 4 LOCATIONS (EACH STAIRWELL) PER FLOOR- 2 EXISTING
<p>ELECTRICAL SYSTEM</p>	<ul style="list-style-type: none"> ● SYSTEM TIES INTO TWO EXISTING 2500 A SWITCH BOARDS <ul style="list-style-type: none"> ○ BOARDS TO BE RECONFIGURED; CONSOLIDATING SMALLER BREAKERS TO FEED A NEW DISTRIBUTION PANEL TO ALLOW LARGER 800 AMP BREAKERS PUT IN PLACE TO SERVE DISTRIBUTION PANELS IN ADDITION ● N+1 REDUNDANCY <ul style="list-style-type: none"> ○ 1000 KW EMERGENCY GENERATOR ○ 5000 GALLON FUEL TANK ○ LOCATED OUTSIDE AWAY FROM BUILDING. REQUIRES UNDERGROUND DUCT BANK TO FEED INTO NEW ELECTRICAL ROOM ○ SIZED FOR EXPANSION ONLY; EXISTING STRUCTURE STILL FEED FROM EXISTING GENERATOR BACK UP PLANT

SCOPE OF WORK	SUMMARY FEATURES
MASONRY	<ul style="list-style-type: none"> ● CMU, FIRE-RATED STAIRWELLS <ul style="list-style-type: none"> ○ SELF-SUPPORTING STAIR TOWER ○ VERTICAL #5 @ 16" O.C, WALL GROUTED SOLID ○ REQUIRES SCAFFOLDING WHOLE HEIGHT ○ ANCHORED AT EACH SLAB ON DECK WITH 3/4" ANCHOR BOLTS WELDED TO ANGLE IRON ● BRICK FAÇADE <ul style="list-style-type: none"> ○ VENEER, NON-LOAD BEARING CAVITY WALL ASSEMBLY ○ ERECTED "BY FACE". SLOWER IN OPENING AREAS UP TO BEGIN INTERIOR TRADES, BUT REQUIRES LESS SCAFFOLDING. ○ ATTACHED TO CFMF WITH VENEER ANCHORS
EXCAVATION SUPPORT	<ul style="list-style-type: none"> ● UNDERPINNING THE EXISTING STRUCTURE WAS NECESSARY DURING EXCAVATION NEAR EXISTING FOUNDATIONS ● SHEETING AND SHORING WERE SUPPORT METHOD OF CHOICE FOR EXCAVATION ● GROUND WATER WAS NOT AN ISSUE (ABOVE WATER TABLE), THEREFORE DEWATERING WAS NOT A CONSIDERATION <ul style="list-style-type: none"> ○ PUMPS WERE USED IF OCCASIONAL RAIN OR SNOW CREATED STANDING WATER

PROJECT COST EVALUATION

COSTS ON ANY PROJECT ARE ALWAYS AN IMPORTANT METRIC TO ESTABLISH AT THE BEGINNING, AND TO CAREFULLY TRACK THROUGHOUT CONSTRUCTION. SEVERAL METHODS CAN BE USED TO ESTABLISH PROJECTED COSTS. THESE METHODS RANGE FROM A VERY QUICK ROM ESTIMATES BASED ON THE COST OF SOME DEFINABLE UNIT (NUMBER OF BEDS FOR A HOSPITAL, COST PER APARTMENT IN A COMPLEX, TOTAL SEATS FOR A THEATRE) TO DETAILED TAKE OFFS OF EACH SYSTEM IN THE PROJECT TO DEVELOP A FINAL BUDGET.

COST PROJECTIONS FOR THIS PROJECT SHOWN BELOW IN TABLE 1 ARE PROVIDED COURTESY OF GILBANE CONSTRUCTION. IT LOOKS AT TOTAL PROJECT COSTS, INCLUDING A BREAKDOWN OF SOME MAJOR SYSTEMS IN THE PROJECT. "TOTAL PROJECT" INCLUDES ALL COSTS (LAND, SITEWORK, OVERHEAD, GENERAL CONDITIONS) AND "BUILDING COSTS" INCLUDE ONLY THE COST OF LABOR AND MATERIAL ACTUALLY GOING IN PLACE. IT IS INTERESTING TO NOTE THAT THIS ORIGINAL COST DID NOT INCLUDE THE 1ST FLOOR EMERGENCY DEPARTMENT FIT OUT, OR THE 2ND STORY FITOUT. THESE SPACES WERE ORIGINALLY DESIGNATED AS SHELL SPACE ONLY. ONE CHANGE ORDER HAS BEEN PROCESSED ALREADY TO ADD THE FINISH SCOPE OF THE 1ST FLOOR EMERGENCY DEPARTMENT. THE TOTAL CONTRACT AT BASED ON THIS ADDITION STANDS AT ROUGHLY \$35 MILLION.

FOR COMPARISON, IN THIS REPORT TWO METHODS WERE USED TO EXAMINE PROJECT COSTS. ONE WAS A SQUARE FOOT ESTIMATE BASED ON RS MEANS SQUARE FOOT ESTIMATING BOOK. THE EXCERPTS USED FOR DATA ARE SHOWN IN APPENDIX 1. ESTIMATING BY THIS METHOD TAKES A LOOK AT BUILDING PERIMETER, STORY HEIGHT, AND TOTAL SQUARE FOOTAGE AS THE DEFINABLE UNITS ON WHICH AN ESTIMATE CAN BE BUILT. AS SHOWN IN TABLE 2 BELOW, THE FIGURE COMES IN EXTREMELY HIGH COMPARED TO THE GMP SUBMITTED BY GILBANE, EVEN WITH THE ADJUSTMENTS MADE AS OUTLINED IN TABLE 3. MEANS TRADITIONALLY RUNS HIGH, BUT AT ALMOST 200% OF THE ORIGINAL COST, AND 160% OF CURRENT CONTRACT, THIS METRIC CLEARLY WOULD NOT BE ADVANTAGEOUS FOR ANY EARLY COST PROJECTIONS WITHOUT SERIOUSLY IMPACTING WHAT AN OWNER MAY OR MAY NOT CONSIDER FOR THE PROJECT IN TERMS OF SCOPE.

D4 COST ESTIMATES RAN CLOSER TO PROJECT COSTS, BUT WAS STILL 160% OVER ORIGINAL COST AND 134% ABOVE CURRENT CONTRACT. THE SUMMARY OF THE D4 COST ESTIMATE IS BELOW IN TABLE 4. A FULL PRINTOUT OF THE ESTIMATE HAS BEEN INCLUDED IN APPENDIX II. A HOSPITAL EXPANSION/RENOVATION IN UTAH WAS THE CLOSEST PROJECT IN D4. ONLY ONE BUILDING WAS USED FOR COMPARISON. AS PARAMETERS WERE EXPANDED AND EVEN SEEMINGLY CLOSELY RELATED PROJECTS WERE ADDED, THE ESTIMATES BECAME FURTHER AND FURTHER AWAY FROM THE ACTUAL COSTS.

THESE EXTREMELY HIGH COST PROJECTIONS CAN BE ATTRIBUTED TO ONE PLACE VERY QUICKLY. THE ORIGINAL GMP HAD TWO FULL STORIES WORTH OF SHELL SPACE. NO CONSIDERATION WAS MADE FOR THE FINISHES, THE INTENSIVE MEP ROUGH-IN, OR FINAL FIT OUT THAT CLEARLY ADDS SIGNIFICANT COST TO A PROJECT. HOWEVER, EVEN ONCE SOME OF THESE COSTS ARE INCORPORATED, EVEN THE BEST ESTIMATE

(D4) WAS STILL MORE THAN 30% HIGHER. CLEARLY THERE IS CONSIDERABLE ERROR INVOLVED WITH SUCH EARLY ESTIMATING METHODS.

IT IS CONFUSING THAT THE ESTIMATES WERE SO MUCH HIGHER THAN THE PROJECT COST. THIS VERTICAL EXPANSION IS A TRICKY PROJECT, AND IT CAN BE EXPECTED THAT PREMIUMS ARE PAID WHEN EXPANDING NEXT TO AN EXISTING, FULLY FUNCTIONAL HOSPITAL. CLEARLY, GILBANE HAS MADE AN ART FORM OUT OF THE PROCESS AND IS ABLE TO REALIZE CONSIDERABLE SAVINGS AGAINST WHAT THE "AVERAGE" IS BASED ON IN RS MEANS AND D4.

TABLE 1- COST BREAKDOWN

COST BREAKDOWN		
	COST	COST/SF
TOTAL PROJECT (ORIGINAL)	\$ 31,318,000	\$ 116
BUILDING COSTS (ORIGINAL)	\$ 26,413,000	\$ 98
SYSTEMS		
MECHANICAL	\$ 9,203,000	\$ 34
STRUCTURAL STEEL	\$ 1,554,000	\$ 6
ELECTRICAL	\$ 3,084,000	\$ 11
MASONRY	\$ 1,052,000	\$ 4
CONCRETE	\$ 1,035,000	\$ 4
SPRINKLER	\$ 444,500	\$ 2

TABLE 2- SQUARE FOOTAGE ESTIMATE

SQUARE FOOTAGE ESTIMATE		
TOTAL BUILDING AREA	270000	SF
TOTAL BUILDING PERIMETER	1030	LF
STORY HEIGHT	13	FT
RS MEANS VALUE	\$ 226.80	PER SF

PROJECT TOTAL COST	\$ 61,235,757
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TABLE 3- RS MEANS ADJUSTMENTS AND BREAKDOWN

MEANS COST ADJUSTMENTS AND BREAKDOWN			
ADJUSTMENT FOR STORY HEIGHT	ADD	\$ 1.30	PER FT
PERIMETER ADJUSTMENT	DEDUCT	\$ 1.60	PER 100 FT
INTERPOLATED RS MEANS VALUE		\$ 229.39	PER SF
LOCATION FACTOR		0.99	
FINAL RS MEANS SF COST		\$ 226.80	PER SF

TABLE 4- D4 COST ESTIMATE

D4 ESTIMATE	
TOTAL PROJECT COST	\$51,868,273.00
BUILDING COSTS	\$47,865,918.00
GENERAL REQUIREMENTS	\$ 1,914,590.00
SITework	\$ 2,087,764.00

SITE PLAN OF EXISTING CONDITIONS

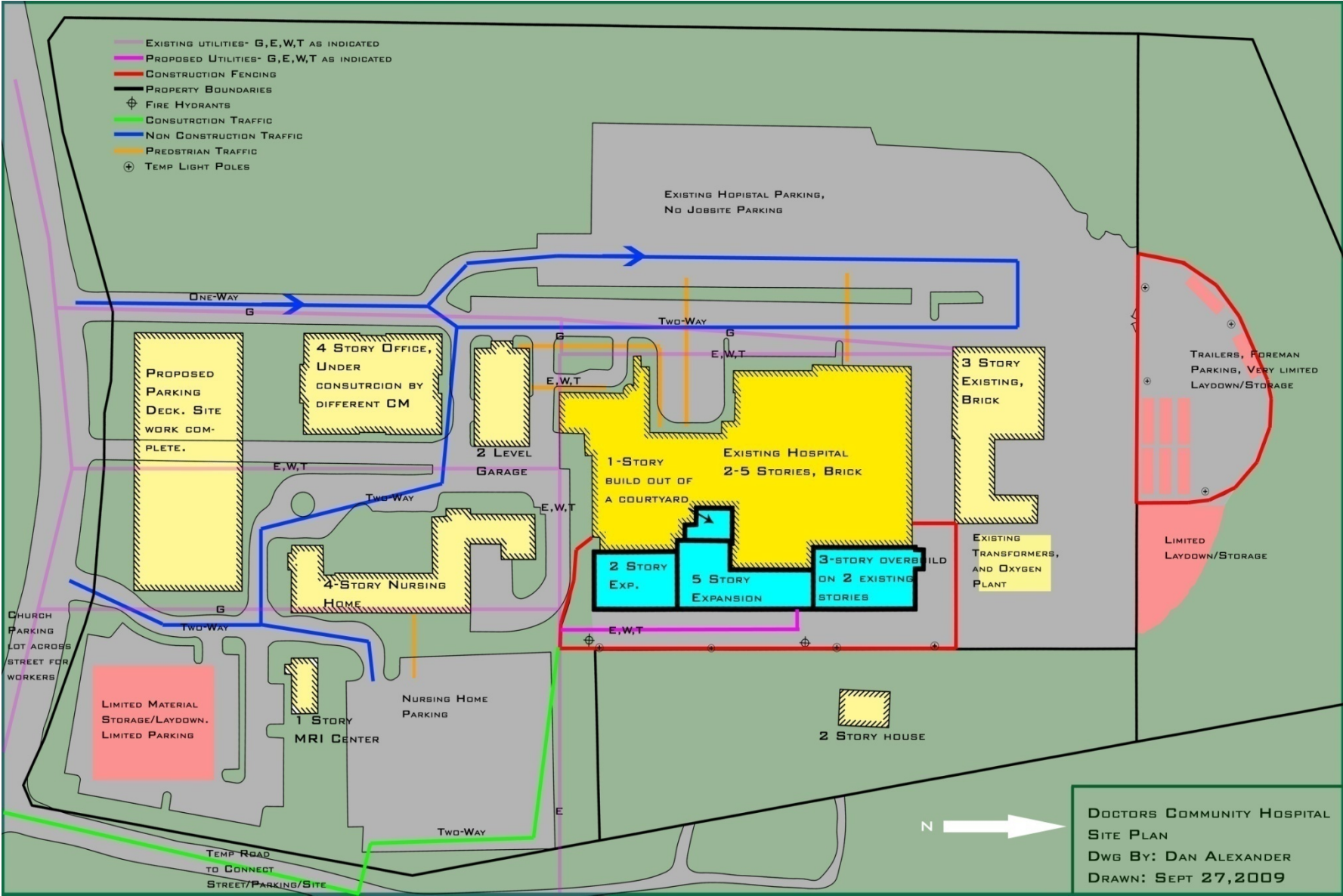
SPACE AT THE DOCTORS COMMUNITY HOSPITAL EXPANSION IS IN VERY SHORT SUPPLY. FOUR FACTORS CONTRIBUTE TO THIS REALITY.

1. THEY ARE NOT BUILDING ON AN OPEN SITE. AS SEEN IN FIGURE 3 BELOW, THERE ARE 6 OTHER STRUCTURES, INCLUDING THE ONE THEY ARE EXPANDING, ALREADY ON SITE. STRUCTURES 7 AND 8 ARE CURRENTLY UNDER WAY ON THE SOUTH END OF THE SITE. ONE IS A NEW PARKING DECK; THE OTHER IS A NEW MEDICAL OFFICE BUILDING. ALL OF THESE STRUCTURES TAKE UP SPACE THAT COULD BE USED FOR LAY DOWN, BUT IS CLEARLY NOT AVAILABLE.
2. CONSTRUCTION IS OCCURRING ON THE EAST SIDE OF THE CURRENT HOSPITAL, WHICH ABUTS A PRIVATE RESIDENCE. THEY ARE UNABLE TO UTILIZE ANY SPACE BEYOND THE PROPERTY LINE, WHICH LIMITS THE PATH WAY ON THE EAST TO A MERE 25' FROM THE FOOTPRINT OF THE EXPANSION. BETWEEN THIS LIMITED ROAD WAY, AND THE EXISTING BUILDING THEY ARE EXPANDING ON THE OTHER SIDE, ACCESS TO THE CONSTRUCTION IS EXTREMELY LIMITED AND CREATES AN EXORBITANT AMOUNT OF CONGESTION.
3. CONTRACTORS ARE COMPETING FOR SPACE WITH THE OTHER CONSTRUCTION SITE ON CAMPUS. BOTH SITES ARE IN NEED OF LAY DOWN AND MATERIAL STORAGE SPACE, WHICH IS A FINITE QUANTITY. THE APPARENT "GREEN SPACE" IN FIGURE 3 IS UNFORTUNATELY NOT OPEN FIELD, BUT RATHER HEAVILY FORESTED AREAS THAT THEY CANNOT CLEAR TO CREATE MORE SPACE DUE TO ZONING REGULATIONS.
4. MUCH OF THE PARKING LOT SPACE MUST REMAIN USABLE SO THAT THEY HOSPITAL MAY CONTINUE FUNCTIONING NORMALLY. BOTH MEDICAL STAFF AND PATIENTS MUST BE ABLE TO ACCESS THE FULLY FUNCTIONAL HOSPITAL THROUGHOUT THE DURATION OF CONSTRUCTION. THIS FACT LIMITS THE AMOUNT OF PARKING LOT SPACE THAT CAN BE USURPED FOR CONSTRUCTION ACTIVITIES.

THESE FACTORS CAUSE A SIGNIFICANT RISK OF IMPACTING THE CONSTRUCTION OF THIS PROJECT. THE CONGESTION CAN LEAD TO PRODUCTIVITY INEFFICIENCIES THAT CAUSE SCHEDULE DELAYS AND COST OVERRUNS. RISK IS AN EVIL THAT MUST BE MANAGED EFFECTIVELY ON ANY CONSTRUCTION PROJECT, AND THIS ONE IS NO DIFFERENT. SPACE LIMITATION IS BY FAR, ONE OF, IF NOT THE LARGEST, AREA OF RISK PRESENT AT THE DCH VERTICAL EXPANSION.

ANOTHER LARGE AREA OF RISK RELATED TO SITE PLANNING IS NON CONSTRUCTION TRAFFIC (VEHICULAR AND PEDESTRIAN). THE HOSPITAL WILL MAINTAIN FULL FUNCTIONALITY THROUGHOUT THE PROJECT. AMBULANCES MUST BE ABLE TO COME AND GO FREELY AND QUICKLY. THIS NEED WILL MAKE IT IMPERATIVE TO HAVE PROMINENT AND CLEAR SIGNAGE TO DIRECT STAFF, PATIENTS, AND CONSTRUCTION TRAFFIC IN THE RIGHT DIRECTION TO: REDUCE CONGESTION, KEEP PEOPLE SAFE, AND NOT IMPACT HOSPITAL OPERATIONS.

FIGURE 3 - DCH SITE PLAN



LOCAL CONDITIONS

DOCTORS COMMUNITY HOSPITAL IS BEING CONSTRUCTED IN LANHAM, MARYLAND, A SUBURB OF WASHINGTON, DC, LOCATED JUST OUTSIDE OF THE CAPITAL BELTWAY ON A 33 ACRE SITE. THE MAJORITY OF THE SITE HAS ALREADY BEEN DEVELOPED BY THE HOSPITAL AND CONSISTS EITHER OF PARKING LOTS OR OTHER BUILDINGS. THE REMAINDER OF THE SITE IS DENSE TREES, WHICH CANNOT BE REMOVED OR DISTURBED DURING CONSTRUCTION DUE TO ZONING ORDINANCES AND BUFFER REQUIREMENTS.

PREFERRED CONSTRUCTION METHODS IN THE DC AREA GENERALLY FOCUS ON LOW FLOOR-TO-FLOOR HEIGHTS DUE TO HEIGHT RESTRICTIONS WITHIN THE DISTRICT. SATISFYING THIS RESTRICTION HAS TYPICALLY LED TO AN INCREASED USE OF CONCRETE STRUCTURES. THIS PROJECT IS NOT SUBJECT TO THESE RESTRICTIONS SINCE IT IS JUST OUTSIDE OF CITY LIMITS, AND AS SUCH, HAS ELECTED TO USE A STEEL SUPERSTRUCTURE.

THIS PROJECT IS NOT SEEKING LEED CERTIFICATION, BUT GILBANE HAS SET A COMPANY POLICY OF ACHIEVING 75% RECYCLING ON ALL PROJECTS. DEBRIS MUST BE SORTED ON SITE BETWEEN TWO DUMPSTERS. ONE IS DESIGNATED FOR "HEAVY DEBRIS", CONCRETE, CMU, BRICK, ETC AND THE OTHER DUMPSTER HAS ALL OTHER CONSTRUCTION WASTE. DUMPSTERS ARE AVERAGING BEING PULLED BETWEEN 1 AND 2 TIMES PER WEEK, AT A COST OF \$400/PULL. EAI, INC, IS RESPONSIBLE FOR TAKING THEM AWAY, AND THEY HANDLE ALL THE RECYCLING NEEDS OF THE PROJECT.

SEVERAL BORINGS WERE TAKEN AROUND THE SITE TO ESTABLISH A GOOD THOUGHT PATTERN ON WHAT TYPES OF SOIL WERE LIKELY TO BE DISCOVERED DURING EXCAVATION. AN EXCERPT OF THIS REPORT CAN BE FOUND IN APPENDIX II, AS WELL AS BORING LOCATIONS. BORING LOGS CONFIRMED WHAT WAS ALREADY SUSPECTED; NO ROCK WAS TO BE ENCOUNTERED DURING EXCAVATION AND THE WATER TABLE WILL NOT BE A FACTOR. WATER LEVELS WERE NOT HIT GENERALLY UNTIL ABOUT THE 30' MARK BELOW GRADE. ALMOST ALL EXCAVATION WOULD STAY ABOVE THIS MARK. AS SUCH, ONLY DEWATERING DUE TO RAIN/SNOW WOULD BE A CONSIDERATION FOR DCH. THE ONLY STRUCTURE THAT GOES DEEPER ARE DRILLED CAISSONS, FOR WHICH WATER LEVELS HAVE MINIMAL IMPACT. SOIL TYPES RANGED FROM LEAN CLAY TO SANDY SILT. NO ROCK WAS DISCOVERED VIA BORINGS, WHICH BODES WELL FOR A SPEEDY EXCAVATION.

AS MENTIONED ABOVE IN THE SITE PLAN SECTION, THIS PROJECT IS VERY TIGHT ON SPACE. AS A RESULT, PARKING IS LIMITED TO ONE FOREMAN TRUCK FOR WORK CREWS PER COMPANY ALLOWED ON SITE IN THE TRAILER COMPOUND. OTHER WORKERS ARE RESPONSIBLE FOR PARKING ELSEWHERE, OFF-SITE. MANY OF THEM HAVE TAKEN TO PARKING AT A LARGE CHURCH LOT ACROSS THE STREET. THIS HAS BEEN A SUFFICIENT SOLUTION TO THIS POINT IN THE PROJECT, AND HAS NO SIGNS OF CHANGING.

CLIENT INFORMATION

DOCTORS COMMUNITY HOSPITAL IS A PRIVATELY RUN, NOT-FOR-PROFIT ORGANIZATION LOCATED IN PRINCE GEORGES COUNTY, MARYLAND, WHICH IS ADJACENT TO WASHINGTON, DC. THEIR GOAL IS TO SERVE THE SURROUNDING AREA OF PG COUNTY AND PROVIDE TOP NOTCH MEDICAL SERVICE TO THOSE PEOPLE IN THE REGION.

THIS EXPANSION WAS BORNE OUT OF A PERCEIVED NEED TO CREATE MORE SPACE TO ADEQUATELY SERVE THE NEEDS OF ITS PATIENTS. CURRENTLY, THE HOSPITAL IS VERY CROWDED, AND MANY ROOMS THAT WERE ORIGINALLY DESIGNED TO BE PRIVATE, INDIVIDUAL ROOMS HAVE BEEN TURNED INTO SEMI-PRIVATE, TWO PERSON ROOMS. THE VERTICAL EXPANSION IS AIMED TO CREATE ENOUGH NEW PATIENT ROOMS THAT THEY CAN CONTINUE TO SERVE THE REGION, BUT OFFER PRIVATE ROOMS FOR ALL INDIVIDUALS THAT REQUIRE OVERNIGHT STAYS AT THEIR FACILITIES. THROUGH THIS PROJECT, COUPLED WITH OTHER CONSTRUCTION UNDERWAY ON THE CAMPUS AS WELL, THEY ALSO HOPE TO EXPAND THEIR INFLUENCE AND REACH INTO NEIGHBORING ANNE ARUNDEL COUNTY FOR PATIENT CARE.

OWNERS WANT IT ALL; AS QUICKLY AS POSSIBLE, AT THE HIGHEST QUALITY, WITH AS LITTLE COST AS POSSIBLE TO THEM. THE DCH PROJECT IS NO EXCEPTION. THROUGH CONVERSATIONS WITH A MEMBER OF THE DCH MANAGEMENT TEAM, THIS MANTRA HELD TRUE. HE DID, HOWEVER, CONCEDE THAT IN THE END, COST WAS MOST IMPORTANT TO THE PROJECT, WITH SCHEDULE FOLLOWING CLOSELY BEHIND. HOLDING THESE ITEMS IN THIS ORDER, THEIR PHILOSOPHY IS BEST EXEMPLIFIED BY BRINGING ON A CM IN A GMP CONTRACT VERY EARLY IN THE PROJECT. THEY WERE ABLE TO GATHER FEEDBACK AND CONSTRUCTABILITY REVIEWS EARLY IN THE PROJECT FROM A TEAM WHO HAS A POSITIVE TRACK RECORD IN THE HEALTHCARE INDUSTRY. THIS ALLOWED FOR VALUE-ENGINEERING FEEDBACK EARLY IN THE PROCESS, AND HELPED TO ENSURE REALISTIC EXPECTATIONS FOR THE SCHEDULE OF THE PROJECT.

ONE OF THE BIGGEST CONCERNS FOR THE OWNER IS THAT CONSTRUCTION DOES NOT AFFECT THE CONTINUOUS OPERATION OF THE EXISTING FACILITY. OUTAGES MUST BE WELL-COORDINATED WITH THE OWNER AND MUST OCCUR DURING NON PEAK HOURS IN ORDER TO MINIMIZE THE IMPACT ON THE HOSPITAL. AT DCH, OUTAGES ARE SCHEDULED FOR NIGHT SHIFTS TO MITIGATE ANY INCONVENIENCES, WHICH IS SOMETHING THAT SUBCONTRACTORS MUST BE AWARE OF AND USE MANPOWER ACCORDINGLY. THIS CONNECTION AND OVERLAPPING WITH THE EXISTING SYSTEMS, AND SEAMLESS APPLICATION THEREOF, IS A BIG OPPORTUNITY TO PLEASE THE CLIENT. DURING A PHONE CONVERSATION, IT WAS INDICATED THAT THE BIGGEST FACTOR IN DEEMING THIS PROJECT A "SUCCESS", WILL BE THE FLAWLESS INTERACTION AND OPERATION OF THE NEW EXPANSION WITH THE EXISTING FACILITIES.

SCHEDULE IS THE DRIVING FACTOR FOR THE OWNER, ESPECIALLY AS IT RELATES TO THE PHASED OCCUPANCY. THEY FEEL CRAMPED WITH THEIR CURRENT EMERGENCY DEPARTMENT AND NEED THE NEW SPACE AS SOON AS POSSIBLE. THEY ALSO DESIRE TO GET THE NEW PATIENT TOWER OPEN QUICKLY TO BEGIN OFFERING PRIVATE ROOMS FOR MORE PATIENTS AGAIN.

DANIEL ALEXANDER | CM | DR. MESSNER
DOCTORS COMMUNITY HOSPITAL | LANHAM, MD
SEPTEMBER 29, 2008

AS A RESULT OF THE AFOREMENTIONED SCHEDULE IMPETUS, PHASED OCCUPANCY IS BEING EMPLOYED ON THE DCH PROJECT. EMERGENCY DEPARTMENT OPERATION AND OCCUPANCY BEGINS EARLY IN FEBRUARY '09. BY OPENING IT SOONER, IT WILL HELP TO MORE ADEQUATELY SERVE THE NEEDS OF THE OWNER AND THE REGION. THE LESS CRITICAL, ALTHOUGH WHOLLY IMPORTANT, PATIENT TOWER WILL FOLLOW IN SEPTEMBER. RENOVATIONS ARE SLATED TO FOLLOW THE TOWER, AND WILL BE COMPLETED BY MARCH OF 2010. AT THIS POINT, THE FACILITY WILL BE FULLY FUNCTIONAL AND ALL OCCUPANTS WILL BE IN PLACE.

PROJECT DELIVERY SYSTEMS

DOCTORS COMMUNITY HOSPITAL ELECTED TO HAVE THIS PROJECT DELIVERED AS A DESIGN-BID-BUILD PROJECT. CR GOODMAN ASSOCIATES WAS SELECTED TO HANDLE THE ARCHITECT DUTIES FOR THIS EXPANSION. THEIR SELECTION WAS BASED ON A DESIRE FROM DCH TO HAVE A LOCAL, MEDIUM SIZE FIRM BE THE ARCHITECT. THIS DESIRE STEMS FROM THE INHERENTLY COMPLEX NATURE OF BUILDING AN EXPANSION NEXT TO, AND OVER, AN EXISTING HOSPITAL THAT IS TO MAINTAIN FULL FUNCTIONALITY DURING THE CONSTRUCTION. ANOTHER FACTOR IN CR GOODMAN'S FAVOR WAS TWO HIGHLY FAVORABLE RECOMMENDATION FROM NEARBY HOSPITALS WHO HAD JUST UNDERGONE RENOVATIONS DESIGNED BY THE COMPANY. THEY WERE PLEASED WITH THE DETAIL ORIENTATED NATURE, AND ABILITY TO BLEND EXISTING ARCHITECTURE AND NEW ARCHITECTURE TOGETHER TO CREATE A SEAMLESS FEEL. AS ILLUSTRATED IN THE CHART BELOW, FIGURE 4, CR GOODMAN WAS HIRED, AND IS UNDER A LUMP SUM CONTRACT WITH DCH.

GILBANE WAS SELECTED AS THE CM AT RISK FOR THIS PROJECT BASED ON A NUMBER OF FACTORS. FIRST AND FOREMOST, ACCORDING TO DCH, WAS THEIR LARGE PRESENCE IN THE MARYLAND MARKET. DCH WAS RELUCTANT TO HAVE SOME LARGE FIRM "SHIPPING" PEOPLE IN FOR THE PROJECT THAT DO NOT HAVE A ROUTINE AND SIZEABLE WORK FORCE IN MD. ANOTHER FACTOR WAS GILBANE'S STELLAR RECORD IN THE HEALTHCARE SECTOR. GILBANE'S REPUTATION PRECEDED THEM, AND THIS FACT WORKED HEAVILY IN THEIR FAVOR. DCH OWNER'S ALSO STATED THAT THEY FELT A CLOSER, BETTER CHEMISTRY WITH THE GILBANE PERSONNEL THROUGHOUT THE SELECTION PROCESS WHICH PUT THEM ABOVE THE 7 OTHER FIRMS VYING FOR THE CONTRACT.

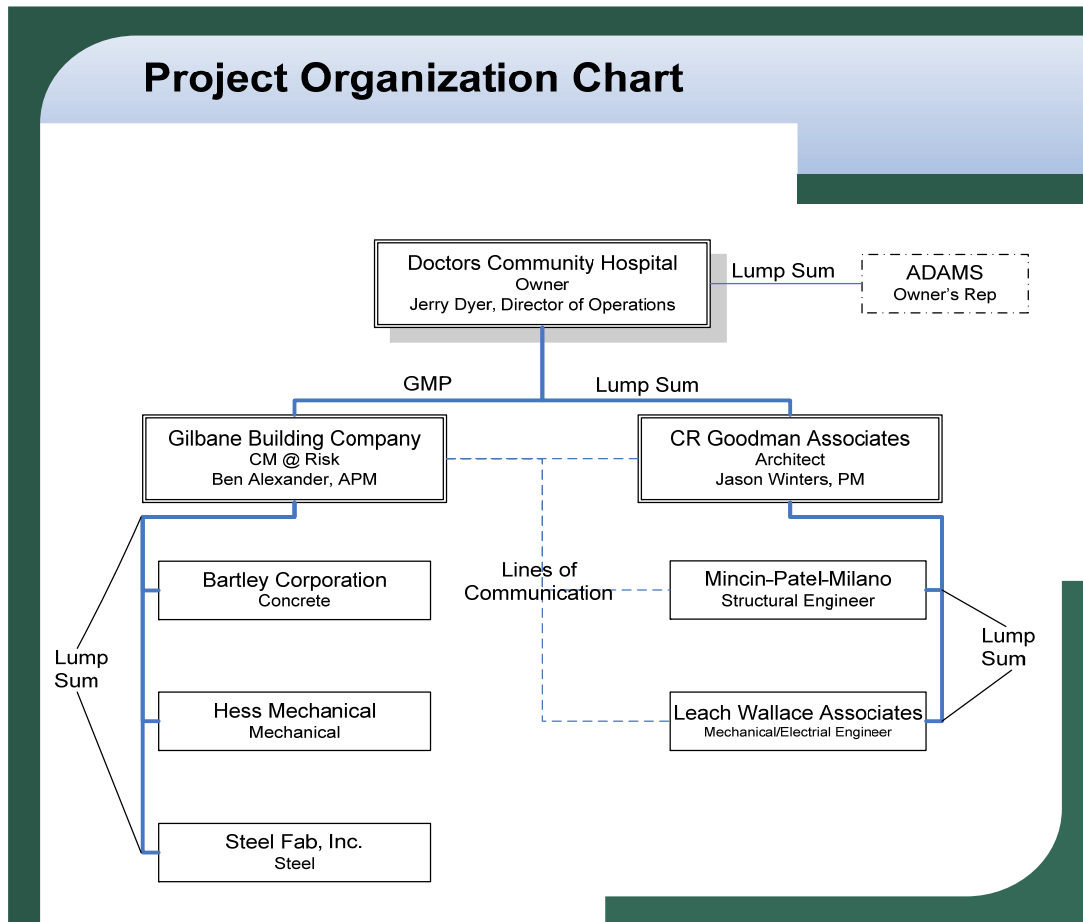
GILBANE ENTERED INTO A GUARANTEED MAXIMUM PRICE CONTRACT WITH DCH. DUTIES UNDER THIS CONTRACT DID NOT ONLY INCLUDE MANAGING THE PROJECT, BUT THEY WERE BROUGHT ON VERY EARLY IN THE PROCESS TO ASSIST WITH DESIGN DEVELOPMENT AND CONSTRUCTABILITY REVIEWS. THE CONTRACT CALLS FOR TYPICAL BUILDER'S RISK INSURANCE AND GENERAL LIABILITY INSURANCES. INTERESTINGLY ENOUGH, ON A PROJECT WITH SUCH A CRITICAL SCHEDULE, NO LIQUIDATED DAMAGES ARE IMPLEMENTED.

DCH IS NOT REQUIRING BONDS ON THE PROJECT IN THE TRADITIONAL FORM. INSTEAD, CONTRACTORS DEFAULT INSURANCE IS BEING IMPLEMENTED. THIS INSURANCE PRACTICE IS HANDLED MORE AT THE CORPORATE LEVEL OF THE COMPANY, AND HAS LESS IMPACT AT THE DAY TO DAY LEVEL IN TERMS OF ADDING BOND COSTS TO CHANGE ORDERS. A MAIN ADVANTAGE TO THIS MODEL IS THAT SHOULD A CONTRACTOR DEFAULT, THE STEP OF A BONDING AGENCIES INVESTIGATION IS FORGONE, AND THE CONTRACTOR HAS BETTER DISCRETION ON HOW TO PROCEED IN A TIMELY MANNER SO AS TO MITIGATE EFFECTS ON THE SCHEDULE. ON A PROJECT WHERE SCHEDULE IS SO IMPORTANT, THIS FACT CAN BE QUITE BENEFICIAL SHOULD THE UNFORTUNATE NEED ARISE TO CALL ON THE INSURANCE.

OVERALL, THE CONTRACTS ON THIS PROJECT SEEM TO BE GOOD CHOICES FOR THE OWNER. THE GMP FOR GILBANE IS A SOLID CHOICE, AND BY HAVING THEM ON THE PROJECT SOONER, GOOD INSIGHT AND VE SOLUTIONS WERE ABLE TO BE ESTABLISHED. WITH AN EXPANSION, IT WAS SURPRISING NOT TO SEE A COST PLUS

FEE FOR THE ARCHITECT'S CONTRACT. WITH THE POSSIBILITY FOR SO MANY UNKNOWN TO SURFACE RESULTING IN ADDED WORK FOR THE ARCHITECT AS THE EXPANSION AND RENOVATION MORE FORWARD, THIS MAY HAVE BEEN A MORE PRUDENT CONTRACTUAL ARRANGEMENT.

FIGURE 4- OVERALL PROJECT ORGANIZATION CHART

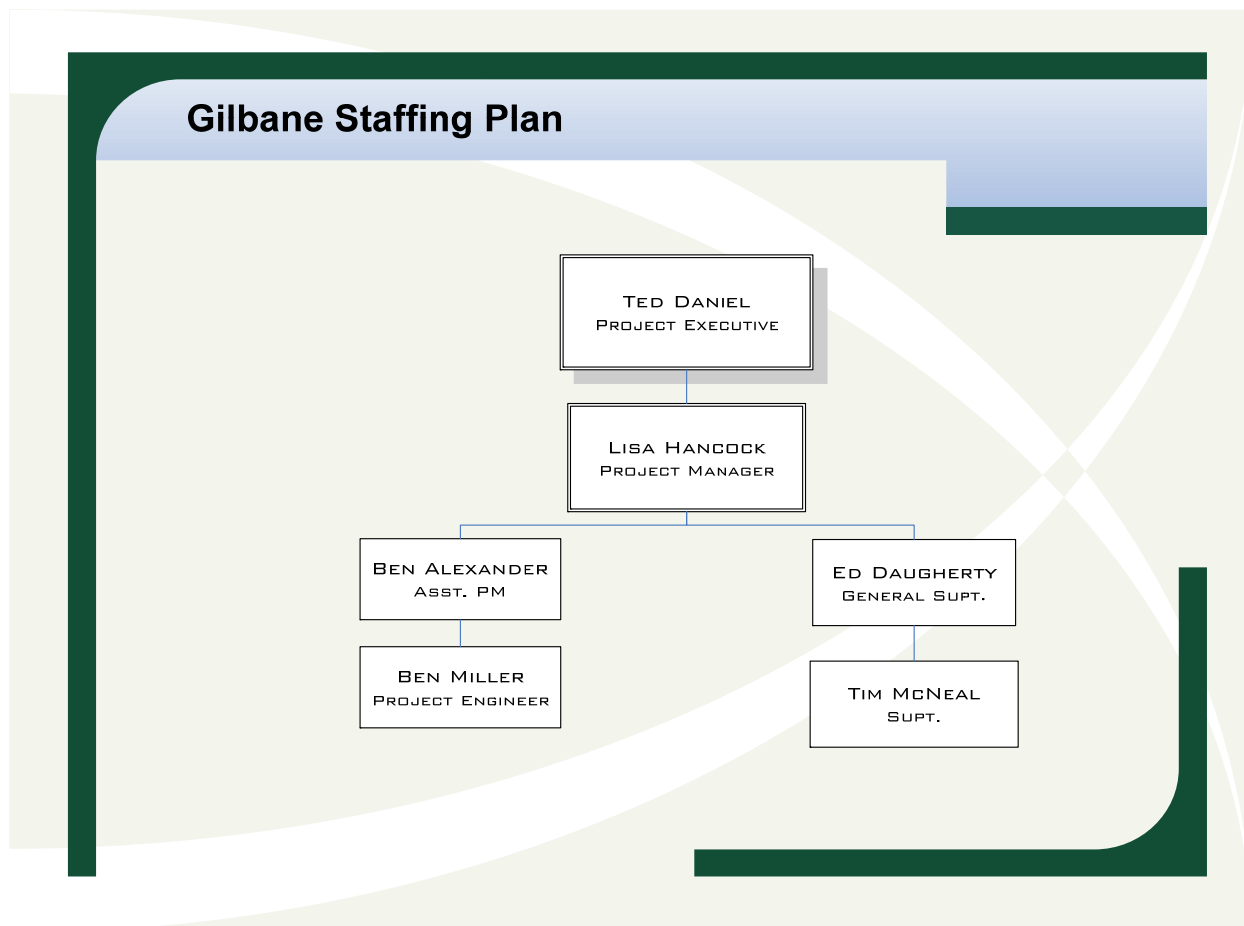


STAFFING PLAN

GILBANE'S STAFFING PLAN IS RELATIVELY STRAIGHT FORWARD, WITHOUT ANY COMPLEX RELATIONS OR SPECIAL POSITIONS AND IS LAID OUT BELOW IN FIGURE 5. THE PROJECT EXECUTIVE OVERSEES THIS PROJECT, ALONG WITH A FEW OTHERS WITHIN THE COMPANY. HE IS GENERALLY NOT ON SITE, AND MAKES APPEARANCES FOR ROUGHLY A DAY EACH WEEK OR LESS. LISA HANCOCK, PROJECT MANAGER, IS THE PRIMARY GILBANE EMPLOYEE IN CHARGE ON SITE. SHE IS SUPPORTED IN HER MANAGEMENT DUTIES BY HER APM, BEN, AND HER PROJECT ENGINEER, ALSO NAMED BEN. IN THE FIELD, GENERAL SUPERINTENDENT ED IS RESPONSIBLE FOR THE CONSTRUCTION ACTIVITIES AND IS SUPPORTED BY TIM.

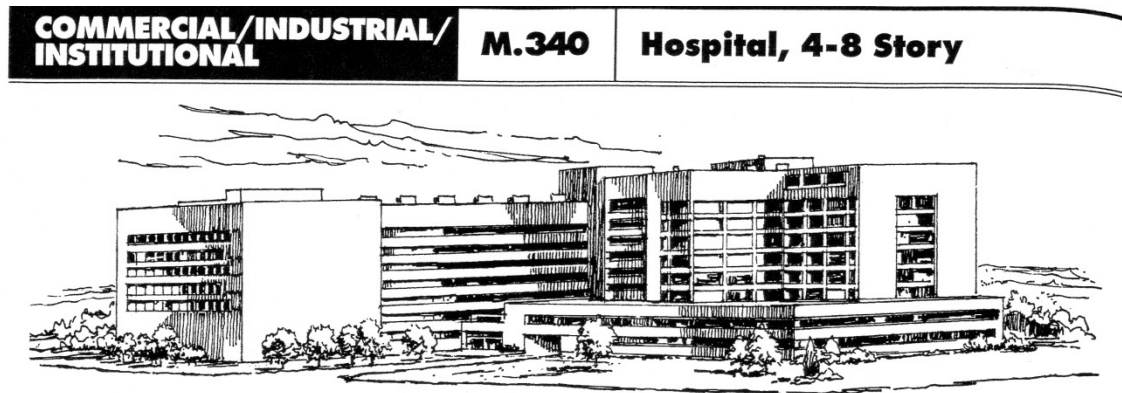
IT IS CURIOUS TO NOTE THAT ON SUCH A MEP INTENSIVE PROJECT, SYSTEMS WHICH ACCOUNT FOR NEARLY HALF OF THE BUILDING COST, THEY DO NOT EMPLOY AT LEAST A PART TIME, IF NOT FULL-TIME, MEP COORDINATOR. GILBANE HAS SPECIALIZED PART OF ITS COMPANY INTO HOSPITAL CONSTRUCTION, EXPANSION, AND RENOVATIONS. COORDINATION IS GENERALLY HANDLED BY THE APM'S AND PROJECT ENGINEERS.

FIGURE 5- STAFF FLOW CHART



APPENDIX I

FIGURE 6- RS MEANS DATA



COMMERCIAL/INDUSTRIAL/INSTITUTIONAL **M.340** **Hospital, 4-8 Story**

Costs per square foot of floor area

Exterior Wall	S.F. Area	100000	125000	150000	175000	200000	225000	250000	275000	300000
	L.F. Perimeter	594	705	816	783	866	950	1033	1116	1200
Face Brick with Structural Facing Tile	Steel Frame	252.95	246.70	242.50	236.10	233.70	231.80	230.35	229.15	228.10
	R/Conc. Frame	262.40	256.00	251.80	245.35	242.95	241.05	239.55	238.30	237.30
Face Brick with Concrete Block Back-up	Steel Frame	247.30	241.10	236.95	231.20	228.90	227.05	225.55	224.45	223.45
	R/Conc. Frame	258.50	252.35	248.20	242.45	240.10	238.30	236.85	235.70	234.65
Precast Concrete Panels With Exposed Aggregate	Steel Frame	249.85	243.65	239.50	233.55	231.20	229.40	227.90	226.75	225.75
	R/Conc. Frame	259.35	253.15	249.00	243.05	240.70	238.90	237.40	236.25	235.25
Perimeter Adj., Add or Deduct	Per 100 L.F.	4.15	3.30	2.75	2.35	2.05	1.90	1.60	1.50	1.40
Story Hgt. Adj., Add or Deduct	Per 1 Ft.	1.85	1.75	1.70	1.40	1.35	1.35	1.30	1.30	1.30

For Basement, add \$31.25 per square foot of basement area

The above costs were calculated using the basic specifications shown on the facing page. These costs should be adjusted where necessary for design alternatives and owner's requirements. Reported completed project costs, for this type of structure, range from \$ 151.70 to \$ 369.90 per S.F.

Common additives

Description	Unit	\$ Cost	Description	Unit	\$ Cost
Cabinets, Base, door units, metal	L.F.	243	Nurses Call Station		
Drawer units	L.F.	480	Single bedside call station	Each	299
Tall storage cabinets, 7' high, open	L.F.	455	Ceiling speaker station	Each	136
With doors	L.F.	690	Emergency call station	Each	182
Wall, metal 12-1/2" deep, open	L.F.	180	Pillow speaker	Each	286
With doors	L.F.	325	Double bedside call station	Each	365
Closed Circuit TV (Patient monitoring)			Duty station	Each	310
One station camera & monitor	Each	1750	Standard call button	Each	157
For additional camera add	Each	940	Master control station for 20 stations	Each	5775
For automatic iris for low light add	Each	2425	Sound System		
Hubbard Tank, with accessories			Amplifier, 250 watts	Each	2225
Stainless steel, 12.5 GPM 45 psi	Each	26,800	Speaker, ceiling or wall	Each	181
For electric hoist, add	Each	2925	Trumpet	Each	345
Mortuary Refrigerator, End operated			Station, Dietary with ice	Each	16,300
2 capacity	Each	12,500	Sterilizers		
6 capacity	Each	22,500	Single door, steam	Each	161,500
			Double door, steam	Each	207,500
			Portable, counter top, steam	Each	3875 - 6050
			Gas	Each	40,000
			Automatic washer/sterilizer	Each	55,500

Location Factors

Costs shown in *RSMeans Square Foot Costs* are based on National Averages for materials and installation. To adjust these costs to a specific location, simply multiply the base cost by the factor for that

city. The data is arranged alphabetically by state and postal zip code numbers. For a city not listed, use the factor for a nearby city with similar economic characteristics.

STATE/ZIP	CITY	Residential	Commercial
ALABAMA			
350-352	Birmingham	.88	.88
354	Tuscaloosa	.79	.81
355	Jasper	.73	.79
356	Decatur	.79	.81
357-358	Huntsville	.85	.86
359	Gadsden	.76	.81
360-361	Montgomery	.78	.81
362	Anniston	.74	.78
363	Dothan	.77	.78
364	Evergreen	.75	.80
365-366	Mobile	.83	.84
367	Selma	.75	.79
368	Phenix City	.76	.81
369	Butler	.76	.79
ALASKA			
995-996	Anchorage	1.27	1.24
997	Fairbanks	1.29	1.24
998	Juneau	1.26	1.22
999	Ketchikan	1.30	1.29
ARIZONA			
850,853	Phoenix	.86	.89
852	Mesa/Tempe	.83	.86
855	Globe	.79	.85
856-857	Tucson	.85	.87
859	Show Low	.81	.86
860	Flagstaff	.86	.89
863	Prescott	.80	.84
864	Kingman	.83	.86
865	Chambers	.80	.84
ARKANSAS			
716	Pine Bluff	.81	.84
717	Camden	.69	.73
718	Texarkana	.74	.76
719	Hot Springs	.69	.74
720-722	Little Rock	.85	.85
723	West Memphis	.79	.81
724	Jonesboro	.78	.82
725	Batesville	.75	.77
726	Harrison	.76	.79
727	Fayetteville	.71	.77
728	Russellville	.76	.78
729	Fort Smith	.78	.81
CALIFORNIA			
900-902	Los Angeles	1.08	1.08
903-905	Inglewood	1.04	1.04
906-908	Long Beach	1.03	1.05
910-912	Pasadena	1.04	1.04
913-916	Van Nuys	1.07	1.06
917-918	Alhambra	1.08	1.05
919-921	San Diego	1.06	1.05
922	Palm Springs	1.04	1.04
923-924	San Bernardino	1.04	1.02
925	Riverside	1.08	1.07
926-927	Santa Ana	1.05	1.04
928	Anaheim	1.08	1.07
930	Oxnard	1.09	1.07
931	Santa Barbara	1.08	1.07
932-933	Bakersfield	1.06	1.06
934	San Luis Obispo	1.07	1.05
935	Mojave	1.05	1.03
936-938	Fresno	1.09	1.08
939	Salinas	1.10	1.09
940-941	San Francisco	1.25	1.23
942,956-958	Sacramento	1.11	1.09
943	Palo Alto	1.18	1.14
944	San Mateo	1.23	1.17
945	Vallejo	1.16	1.13
946	Oakland	1.22	1.18
947	Berkeley	1.24	1.16
948	Richmond	1.25	1.16
949	San Rafael	1.23	1.17
950	Santa Cruz	1.14	1.12
951	San Jose	1.21	1.17
952	Stockton	1.08	1.08
953	Modesto	1.08	1.07

STATE/ZIP	CITY	Residential	Commercial
CALIFORNIA (CONT'D)			
954	Santa Rosa	1.17	1.14
955	Eureka	1.11	1.07
959	Marysville	1.09	1.07
960	Redding	1.09	1.08
961	Susanville	1.09	1.07
COLORADO			
800-802	Denver	.93	.94
803	Boulder	.93	.92
804	Golden	.91	.93
805	Fort Collins	.89	.92
806	Greeley	.79	.86
807	Fort Morgan	.92	.92
808-809	Colorado Springs	.90	.93
810	Pueblo	.91	.93
811	Alamosa	.88	.92
812	Salida	.90	.92
813	Durango	.91	.92
814	Montrose	.87	.91
815	Grand Junction	.91	.92
816	Glenwood Springs	.90	.93
CONNECTICUT			
060	New Britain	1.11	1.09
061	Hartford	1.11	1.09
062	Willimantic	1.11	1.09
063	New London	1.10	1.07
064	Meriden	1.11	1.08
065	New Haven	1.11	1.10
066	Bridgeport	1.12	1.10
067	Waterbury	1.11	1.09
068	Norwalk	1.11	1.09
069	Stamford	1.12	1.11
D.C.			
200-205	Washington	.96	.99
DELAWARE			
197	Newark	1.04	1.04
198	Wilmington	1.05	1.04
199	Dover	1.03	1.05
FLORIDA			
320,322	Jacksonville	.82	.84
321	Daytona Beach	.90	.89
323	Tallahassee	.78	.79
324	Panama City	.75	.78
325	Pensacola	.82	.85
326,344	Gainesville	.81	.86
327-328,347	Orlando	.90	.89
329	Melbourne	.91	.92
330-332,340	Miami	.87	.89
333	Fort Lauderdale	.85	.88
334,349	West Palm Beach	.85	.85
335-336,346	Tampa	.92	.91
337	St. Petersburg	.79	.83
338	Lakeland	.89	.91
339,341	Fort Myers	.87	.87
342	Sarasota	.90	.88
GEORGIA			
300-303,399	Atlanta	.89	.90
304	Statesboro	.71	.77
305	Gainesville	.79	.83
306	Athens	.79	.84
307	Dalton	.75	.79
308-309	Augusta	.80	.83
310-312	Macon	.81	.83
313-314	Savannah	.82	.82
315	Waycross	.75	.80
316	Valdosta	.73	.77
317,398	Albany	.78	.82
318-319	Columbus	.83	.84
HAWAII			
967	Hilo	1.22	1.19
968	Honolulu	1.25	1.21

APPENDIX II

FIGURE 7- D4 ESTIMATE PRINT OUT

DCH D4 Estimate

DCH Expansion - Nov 2007 - MD - Other

Prepared By: Dan Alexander
 PSU 5th Year Thesis

Prepared For: Technical Report 1
 PSU 5th Year Thesis

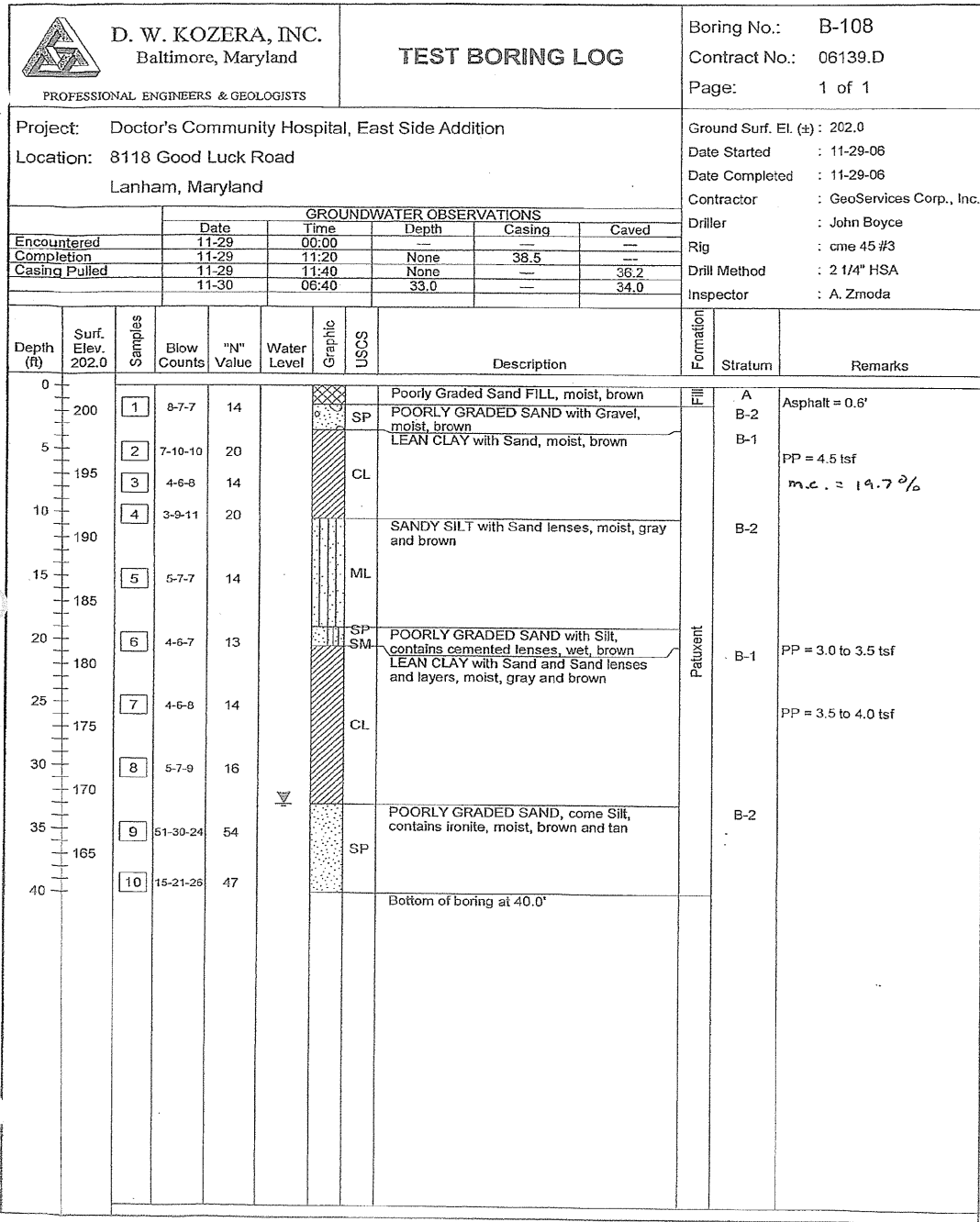
Building Sq. Size: 270000
 Bid Date: 8/1/2007
 No. of floors: 5
 No. of buildings: 1
 Project Height: 80
 1st Floor Height: 13
 1st Floor Size: 88000

Site Sq. Size: 70000
 Building use: Medical
 Foundation: CAS
 Exterior Walls: MAS
 Interior Walls: MAS
 Roof Type: SBS
 Floor Type: VCT
 Project Type: ADD/REN

Division		Percent	Sq. Cost	Amount
01	General Requirements	3.85	7.09	1,914,591
03	Concrete	12.61	23.24	6,275,563
04	Masonry	0.27	0.50	134,454
05	Metals	6.89	12.69	3,427,509
06	Wood & Plastics	4.85	8.95	2,416,563
07	Thermal & Moisture Protection	7.81	14.40	3,887,778
08	Doors & Windows	6.88	12.69	3,425,637
09	Finishes	8.39	15.47	4,177,304
10	Specialties	0.83	1.54	414,850
11	Equipment	0.47	0.87	233,781
12	Furnishings	0.24	0.45	121,202
14	Conveying Systems	3.72	6.86	1,851,800
15	Mechanical	24.01	44.26	11,950,942
16	Electrical	19.18	35.36	9,548,535
Total Building Costs		100.00	184.37	49,780,509
02	Site Work	100.00	29.83	2,087,764
Total Non-Building Costs		100.00	29.83	2,087,764
Total Project Costs		--	--	51,868,273

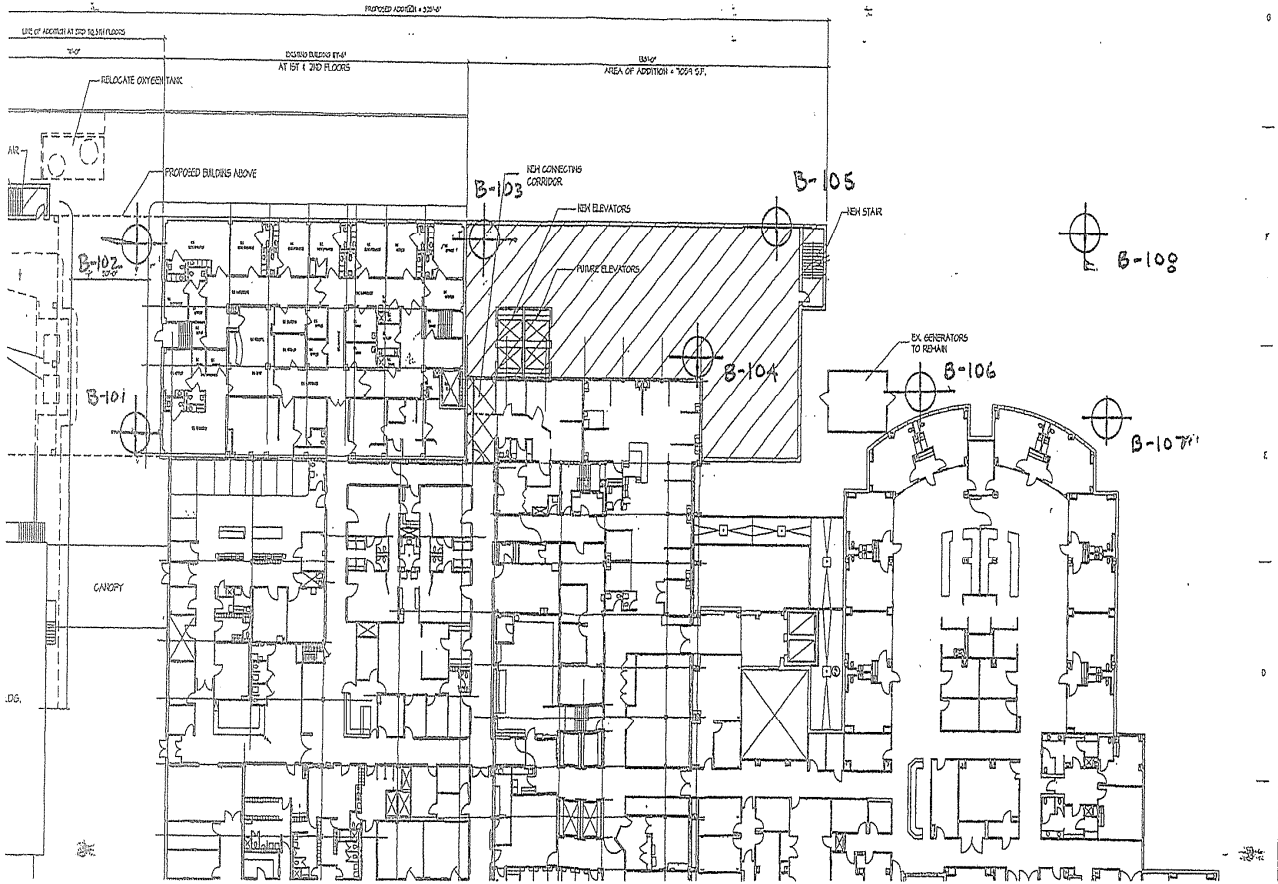
APPENDIX III

FIGURE 8- BORING LOG EXCERPT



TEST BORING LOG
 D. W. KOZERA, INC.
 11/29/06

FIGURE 9- BORING LOCATIONS



TEST BORING LOCATION PLAN