

**STATE OF VERMONT
GREEN MOUNTAIN CARE BOARD**

In re: Construction of Four Story Building to House Medical Offices, Cardiac Rehabilitation, Replacement of Operating Room Suite and Central Sterile Processing, and Replacement of Boilers-Response 3

Docket No. **GMCB-001-16con**

Verification Under Oath

Steven R. Gordon, being duly sworn, states on oath as follows:

1. My name is Steven R. Gordon. I am the President and CEO of Brattleboro Memorial Hospital, Inc. I have reviewed the Construction of Four Story Building to House Medical Offices, Cardiac Rehabilitation, Replacement of Operating Room Suite and Central Sterile Processing, and Replacement of Boilers-Response 3.
2. Based on my personal knowledge and after diligent inquiry, I attest that the information contained in Construction of Four Story Building to House Medical Offices, Cardiac Rehabilitation, Replacement of Operating Room Suite and Central Sterile Processing, and Replacement of Boilers-Response 3 is true, accurate and complete, does not contain any untrue statement of a material fact, and does not omit to state a material fact.
3. My personal knowledge of the truth, accuracy and completeness of the information contained in the Construction of Four Story Building to House Medical Offices, Cardiac Rehabilitation, Replacement of Operating Room Suite and Central Sterile Processing, and Replacement of Boilers-Response 3 is based upon either my actual knowledge of the subject information or upon information reasonably believed by me to be true and reliable and provided to me by the individuals identified below in paragraph 4. Each of these individuals has also certified that the information they have provided is true, accurate and complete, does not contain any untrue statement of a material fact and does not omit to state a material fact.
4. The following individuals have provided information or documents to me in connection with Construction of Four Story Building to House Medical Offices, Cardiac Rehabilitation, Replacement of Operating Room Suite and Central Sterile Processing, and Replacement of Boilers-Response 3 and each individual has certified, based either upon his or her actual knowledge of the subject information or, where specifically identified in such certification, based on information reasonably believed by the individual to be reliable, that the information or documents provided are true, accurate and complete, do not contain any untrue statement of a material fact, and do not omit to state a material fact:

Michael O. Rogers, Vice President Finance


Steven P. Cummings, Vice President Information and Support Services

5. In the event that the information contained in the Construction of Four Story Building to House Medical Offices, Cardiac Rehabilitation, Replacement of Operating Room Suite and Central Sterile Processing, and Replacement of Boilers-Response 3 becomes untrue, inaccurate or incomplete in any material respect, I acknowledge my obligation to notify the Green Mountain Care Board and to supplement the Construction of Four Story Building to House Medical Offices, Cardiac Rehabilitation, Replacement of Operating Room Suite and Central Sterile Processing, and Replacement of Boilers-Response 3 as soon as I know, or reasonably should know, that the information or document has become untrue, inaccurate or incomplete in any material respect.

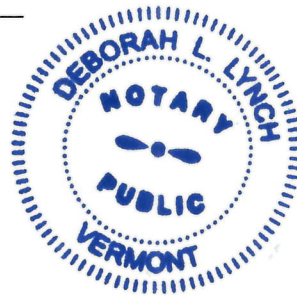


Steven R. Gordon, President and CEO

On May 19, 2017, Steven R. Gordon appeared before me and swore to the truth, accuracy and completeness of the foregoing.



Notary public
My commission expires 2.10.19





Mr. Steven R. Gordon
President and CEO
Brattleboro Memorial Hospital
17 Belmont Avenue
Brattleboro, VT 05301

May 22, 2017

Donna Jerry
Green Mountain Care Board
89 Main Street
Montpelier, VT 05620

RE: Docket No. GMCB-001-16con. Response 3.

Dear Ms. Jerry: 

Please find below our responses to the questions presented in your letter from May 1, 2017.

1. Provide existing plans for all areas to be renovated with sufficient detail by which we can determine that they meet all FGI requirements.

Please refer to Attachment A containing the following:

- Existing First Floor plan for spaces to be renovated indicating areas to be demolished in brown and areas that are currently not FGI Compliant in pink.
- Program Comparison and Guideline Review Spreadsheets indicating compliance with FGI Guidelines for Existing and Proposed Spaces:
 - Central Sterile Processing
 - Minor Procedure/Endoscopy Services
 - Surgical Services

2. Confirm that the twelve existing pre-and post-op beds will remain in the same location and that the space where they are located is not being renovated.

The twelve existing pre and post op beds will remain in their current location. This space will not be renovated.

3. **Provide a schematic level narrative description for all Mechanical, Electrical, Plumbing/Fire Protection (MEP/FP) components for newly constructed and renovated areas.**

Please refer to Attachment B containing the *Mechanical/Electrical Basis of Design Narrative Surgical Services Addition and Renovations* from Fitzmeyer & Tocci Associates, Inc.

4. **Identify the costs associated with each project component: 1) demolition of existing two-story building; 2) construction of new four-story building; 3) renovation of existing spaces; 4) purchase of three new boilers, and 4) boiler plant renovations. (The sum of the components should equal the \$22,692,789 project cost.) Where applicable, provide vendor quotes.**

Please refer to Attachment C containing the construction and renovation costs associated with each project component. These estimates were developed by HP Cummings Construction.

5. **Provide a detailed cost estimate broken down by CSI divisions to include all project components including the boilers, boiler room upgrade and MEP/FP costs.**

Again please refer to Attachment C as the project costs are also broken down by CSI division. The boiler room costs are found in Division 23 HVAC. There are no renovations needed for the boiler room to accommodate the new boilers.

6. **Explain how the proposed fuel type for the three boilers is consistent with the hospital's 2014-2015 Energy Action Plan to reduce operational costs, improve building comfort and performance, improve patient experience and reduce environmental impacts.**

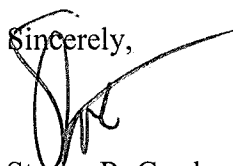
Please see Attachment D containing the BMH Energy Action Plan. This plan indicated that the OR project was an opportunity for energy efficiency gains. By switching from #4 to #2 oil, particulate matter emissions will decrease by 44% and Sulfur Dioxide emissions will decrease by 99% based upon current fuel usage. Further, our current boilers are past their expected design life as they date from 1976 and 1979. We anticipate that new boilers will provide better fuel efficiency than these dating from the late 1970's. This, combined with energy efficient construction, will provide BMH with better energy efficiency per square foot. (A spreadsheet is attached to show the calculations behind the decrease in emissions offered.) We fully intend to work with Efficiency Vermont during this project to explore ways that the boiler plant and other parts of the proposed infrastructure will meet or exceed current energy efficiency standards.

7. Explain whether fuel cost per BTU has changed since the boiler plant fuel analysis was performed by L.N. Consulting last year, and if so, how such change impacts the project.

The LN Consulting report notes that our cost of #4 oil was \$1.927/gal at the time the report was written. On May 1, 2017, BMH agreed to buy #4 oil for the months of June 2017 through April of 2018 for a maximum cost of \$1.85/gallon during this period, a lower cost/BTU than noted in the report. A quick check of oil futures on Bloomberg.com shows heating oil futures (#2 oil) to be trading at the same price today as a year ago. Therefore, the assumptions made by LN engineering with regard to #2 oil in the report of June 7, 2016 would still be valid. Natural gas futures are trading slightly higher than they were a year ago.

As an addendum to the LN Consulting report, in April, 2017 BMH met with representatives of NG Advantage to discuss the possibility of compressed natural gas as a fuel. The result of this meeting determined that BMH does not have appropriate free space to house a CNG transfer and storage facility. NG Advantage did mention that they were looking into the possibility of having a bulk storage facility in the Brattleboro area, which could supply BMH via a piped gas network. It should be noted, that the plans for the BMH boiler plant include burners that can use either gas or #2 oil as fuel. This will allow BMH the flexibility of using compressed natural gas, should a local piped gas supply be available to BMH at a competitive cost per BTU. We believe having dual fuel burners will afford BMH flexibility to use several fuel sources in the future and therefore provide multiple fuel options to compare based upon fuel price and supply.

This concludes our responses to the Round 3 questions posed. We look forward to continuing to work with the Green Mountain Care Board on this important project.

Sincerely,


Steven R. Gordon
President and CEO

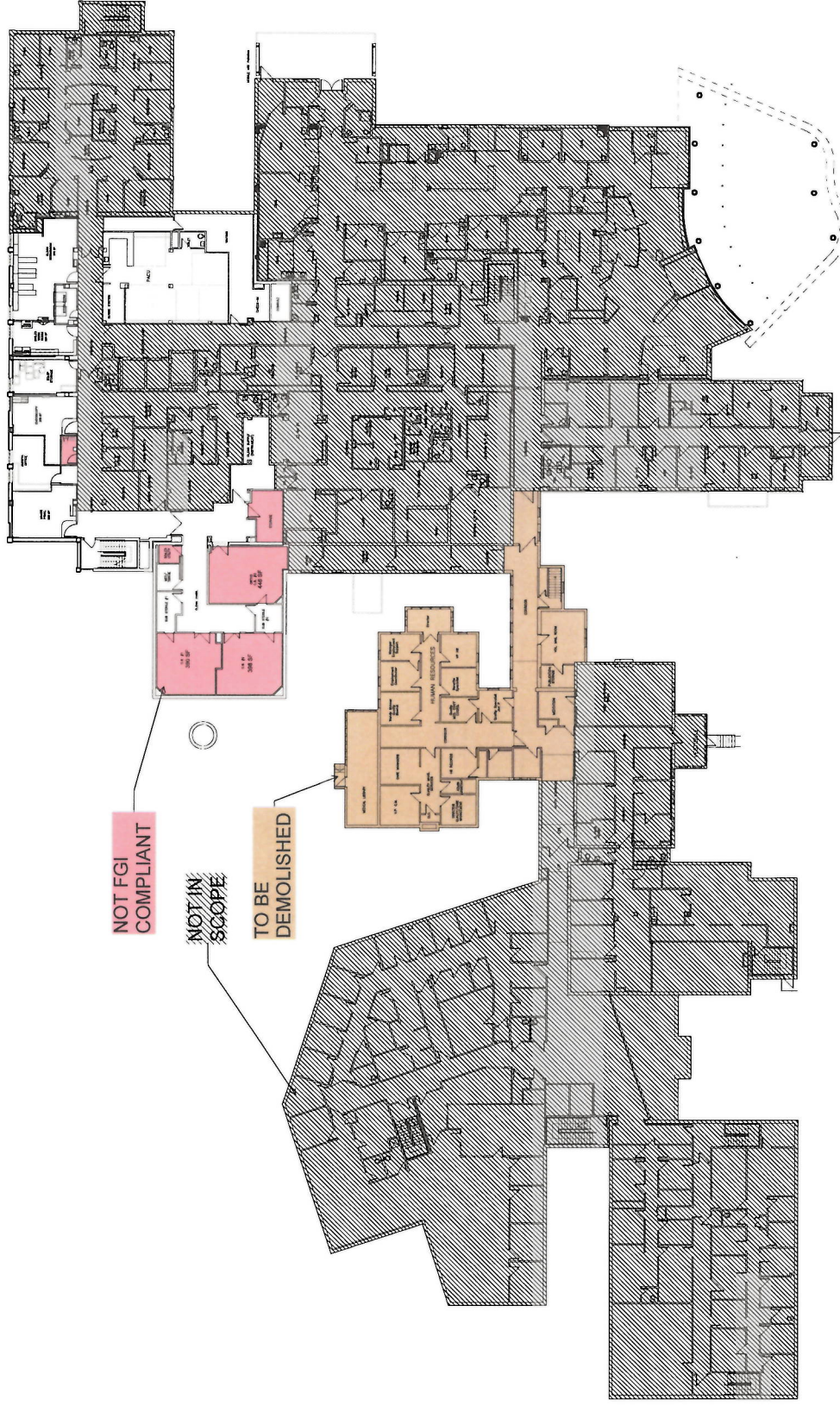
cc. Office of the Health Care Advocate

BRATTLEBORO MEMORIAL HOSPITAL
RONALD READ PAVILION
MODERNIZATION PROJECT

Docket No. GMCB-001-16con

APPENDIX A

- Existing First Floor plan for spaces to be renovated indicating areas to be demolished in brown and areas that are currently not FGI Compliant in pink
- Program Comparison and Guideline Review Spreadsheets indicating compliance with FGI Guidelines for Existing and Proposed Spaces



EXISTING FIRST FLOOR PLAN

SCALE : 1/16"=1'-0"

SCOPE OF WORK and FGI COMPLIANCE

MAY 2017

BRATTLEBORO MEMORIAL HOSPITAL

MODERNIZATION PROJECT

CON SUBMISSION

LAVALLÉE|BRENSINGER ARCHITECTS

2014 FGI Guidelines for Design and Construction of Hospitals and Outpatient Facilities				Existing Space Program		Proposed Space Program	
2.1-5.1 Central Services				Not Compliant	Compliant	Not Compliant	Compliant
2.1-5.1.1.2 Layout				FGI Zone Location		FGI Zone Location	
2.1-5.1.1.2	Clean Assembly/Workroom	Soiled and clean areas must be physically separated. Instrument processing flow shall process from soiled/decon. to clean processing to sterile storage.	Restricted	Sterile instrument flow from clean processing to clean storage traverses a semi-restricted areas.		Instrument flow is from OR to soiled elevator via the semi-restricted corridor, soiled elevator down to Decon, to Clean Processing, up the clean elevator to clean core storage.	
2.1-5.1.1.2	Clean Assembly/Workroom	Shall contain the following; Work space.	Restricted	Clean Assembly/Workroom	560 sf	Clean Assembly/Workroom	926 sf
		Hand washing sink.					
		High-level disinfecting and sterilizing equipment.					
		Shall contain the following; Work counter.	Restricted		225 sf		394 sf
2.1-5.1.1.3	Soiled Workroom	Hand washing sink.		Soiled Workroom			
		Flush rim clinical sink or equivalent.					
		Washer/sterilizer decontaminators.					
		Waste and soiled linen receptacles					
2.1-5.1.1.3	Soiled Workroom	Pass-through doors, window and washer/decontaminator to Clean Processing.					
2.1-5.1.4	Equipment and supply storage	Adjacent but separate from Clean Processing	Unrestricted	Receiving room Does not exist		Receiving room	151 sf
		Lockers, toilet and lounge, can be shared and located outside of the department.	Unrestricted				
2.1-5.1.7	Support areas for staff			Support areas for staff Shared with the surgical staff		Support areas for staff lockers	48 sf
							Toilet

Proposed Space Program

2.2-3.3 Surgical Services		FGI Zone	Location
2.2-3.3.2	Operating Rooms	Restricted	
	400 sf min. w/ min dim. of 20', 600 sf min. for image guided procedures or procedures requiring larger equipment.		
3.7-3.3	Outpatient Operating Rooms (formally class B)	Restricted	
	250 sf. min. with a min. dimension of 15 feet.		
2.2-3.3.4.2	Pre Op Spaces	Unrestricted	
	Cubicle stations 80 sf min. 5' between stretchers, 4' between walls and side of stretcher, 3' between foot of stretcher and cubicle curtain. Single rooms , 3' clear at sides and foot of bed.		
	Hand wash stations		
2.2-3.3.4.3	PACU	Unrestricted	
	Direct access from semi-restricted surgical suite		
	1.5 PACU stations per OR		
	Cubicle stations 80 sf min. 5' between stretchers, 4' between walls and side of stretcher, 3' between foot of stretcher and cubicle curtain.		
	Hand wash stations		
2.2-3.3.4.4	Phase 2 Recovery	Unrestricted	
	Direct access from PACU to Phase 2 Recovery		
	Cubicle stations 80 sf min. 4' between stretchers, 4' between walls and side of stretcher. Single rooms 100 sf min., 3' clear at sides and foot of bed.		
	Hand wash stations		
	Patient toilets, 1:8 patients, direct access from the Phase 2 area		
2.2-3.3.4.6	Support Areas for Pre and Post Op Patient Care Areas		
	Nurse station	Unrestricted	
	Documentation Area	Unrestricted	
	Located in both pre-op and post-op		
	Direct observation of patients		
	Post-op areas	Unrestricted	
	Bedpan cleaning	Unrestricted	
	Med safety zone	Unrestricted	
	Nourishment area	Unrestricted	
	Ice maker	Unrestricted	
	Storage	Unrestricted	
2.2-3.3.4.7	Support areas for staff		
	Staff toilet	Unrestricted	
2.2-3.3.4.8	Support areas for patients, families and visitors		
	Waiting area	Unrestricted	
	Patient changing	Unrestricted	
	Provide for storage of patient belongings, toilets, space for		

2014 FGI Guidelines for Design and Construction of Hospitals and Outpatient Facilities		Existing Space Program		Proposed Space Program	
2.2-3.3 Surgical Services	FGI Zone Location	Not Compliant	Compliant	Not Compliant	Compliant
shall be from a semi-restricted zone. Exit from the sterile process shall be into the semi-restricted zone or directly into the OR.					
Decontamination area shall provide, countertop, hand sink, instrument sink, supply storage.					
Separate the decon area from the cleaning area by a 4' separation or a screen extending 4' above the counter.					
Clean work area shall provide, counter, hand sink, sterilizing equipment, supply storage.					
Refrigerated storage to comply with Section 2.1-4.1.2.3					
Specimen storage			Specimen storage 65 sf	Specimen storage 139 sf	
2.2-3.3.7 Support Areas for Surgical Suite Staff					
Staff lounge				Staff lounge 273 sf	
Changing area	Unrestricted		Changing area 123 sf	Changing area 123 sf	Unrestricted
Female locker room with one or more private changing rms.			Female lockers 173 sf	Female lockers 173 sf	
Male locker room with one or more private changing rms.					
Unisex is permitted with private changing rooms.					
Each changing area shall provide, lockers, showers, toilets, hand sinks, changing rooms, storage for clean and dirty scrubs.					
Location to promote staff flow from the unrestricted area to the semi-restricted area.			No private changing rooms	No private changing rooms	

2014 FGI Guidelines for Design and Construction of Hospitals and Outpatient Facilities			Existing Space Program			Proposed Space Program					
			Not Compliant	Compliant	FGI Zone	Location	Not Compliant	Compliant	FGI Zone	Location	
2.2-3.11.1 Endoscopy Services	2.2-3.11.1.1 General	Provisions shall be made for patient exam, interview, prep, and testing.									
		Three major functional areas, Procedure rooms, instrument processing and Patient holding, prep. and recovery.									
2.2-3.11.2 Procedure Rooms	Space requirements	Min. 200 sf. clear floor area.									
		3'6" min. clearance at head, foot and sides of stretcher.									
Hand washing station	Patient Toilets	Available at each Procedure room per section 2.1-2.6.5									
		Non-public, directly accessible from Procedure rooms, pre-procedure and recovery areas.									
2.2-3.11.3 Pre-procedure and recovery areas.		Spaces can be bays, cubicles, or private rooms.									
		Spaces can be a combination of stretchers and chairs.									
		Located to be under the observation of the nursing staff.									
		Min. number is 1 per Procedure room.									
		Cubicle stations 80 sf min. 5' between stretchers, 4' between walls and side of stretcher, 3' between foot of stretcher and cubicle curtain. Single rooms 100 sf. min., 3' clear at sides and foot of bed.									
		Hand sinks as per Section 2.1-2.6.5									
Hand sink	Patient Toilets	Patient toilets, non-public, directly accessible from pre-procedure and recovery areas.									
		Can serve more than one Procedure room.									
Instrument Processing	General	Instrument processing shall flow from decontamination to clean work area to storage in a separate area.									
		3 feet min. clear separation between decon area and clean work area. Counters and casework shall be impervious to staining and cleaning chemicals.									
Decontamination		Backsplashes shall be 12" high min. Shall provide, work counter, hand sink,									
			AC1	Chair	90 sf	Unrestricted	AC1	Chair	90 sf	Unrestricted	
			AC2	Stretcher	113 sf	Unrestricted	AC2	Stretcher	113 sf	Unrestricted	
			AC3	Chair	81 sf	Unrestricted	AC3	Chair	81 sf	Unrestricted	
			AC4	Stretcher	111 sf	Unrestricted	AC4	Stretcher	111 sf	Unrestricted	
			AC5	Chair	82 sf	Unrestricted	AC5	Chair	82 sf	Unrestricted	
			AC6	Chair	82 sf	Unrestricted	AC6	Chair	82 sf	Unrestricted	
			AC7	Chair	82 sf	Unrestricted	AC7	Chair	82 sf	Unrestricted	
			AC8	Chair	85 sf	Unrestricted	AC8	Chair	85 sf	Unrestricted	
			AC9	Stretcher	119 sf	Unrestricted	AC9	Stretcher	119 sf	Unrestricted	
			AC10	Stretcher	115 sf	Unrestricted	AC10	Stretcher	115 sf	Unrestricted	
			AC11	Stretcher	160 sf	Unrestricted	AC11	Stretcher	160 sf	Unrestricted	
			AC12	Chair	85 sf	Unrestricted	AC12	Chair	85 sf	Unrestricted	
			Pre/recovery area is shared with surgical services.			Pre/recovery area is shared with surgical services.			Pre/recovery area is shared with surgical services.		

2014 FGI Guidelines for Design and Construction of Hospitals and Outpatient Facilities		Existing Space Program		Proposed Space Program	
2.2-3-11.1 Endoscopy Services	FGI Zone Location	Not Compliant	Compliant	Not Compliant	Compliant
Clean work area	and utility sink. Countertop work space, hand sink, storage for supplies Space and utilities for scope cleaning equipment.		Clean work area		Clean work area
Clean scope storage	Can be in clean work area if, storage cabinets have doors, cabinets are 3' min away from sinks, cabinets are located so staff do not cross the decontamination area to get to the cabinets.		Clean scope storage		Clean scope storage
2.2-3-11.6 Support Areas for the Endoscopy Procedure Suite and Other Patient Care areas					
Nurse or control station	One shall be provided		Nurse or control station		Nurse or control station
Documentation area	Documentation areas shall be provided in the procedure room, pre-procedure and patient recovery areas.		Documentation area (in ACU, shared with surgical services)		Documentation area (in ACU, shared with surgical services)
Medication safety zone	As per section 2.1-2.6.6		Medication safety zone		Medication safety zone
Soiled work area	Shall be physically separated from other areas. Contain a hand sink, flush rim sink, work surface, space for trash, linen and contaminated waste.		Soiled work area (in ACU, shared with surgical services)		Soiled work area (in ACU, shared with surgical services)
Equipment and supply storage	Min. area is 25 sf per procedure room. Storage space for stretcher, wheelchairs, emergency equipment, anesthesia equipment.		Equipment and supply storage located in room		Equipment and supply storage located in room
Environmental services room	As per section 2.1-2.6.12		Environmental services room		Environmental services room
Fluid waste disposal	Immediately accessible to procedure rooms and recovery stations.		Fluid waste disposal		Fluid waste disposal
	In a procedure room a clinical sink can be used, in the recovery area a patient toilet with bed pan washer can be used.				To be located in Instrument Processing
2.2-3-11.7 Support Areas for Staff					
Staff changing areas	Female locker room with one or more private changing rooms. Male locker room with one or more private changing rooms. Unisex is permitted with private changing rooms. Each changing area shall provide, lockers, showers, toilets, hand sinks, changing rooms, storage for clean and dirty scrubs. Changing areas can be shared with the surgical suite. Lounge must be provided in a facility		Staff changing areas Changing is shared with surgical services.		Staff changing areas Changing is shared with surgical services.
Lounge and toilet facilities			Lounge and toilet facilities		Lounge and toilet facilities

[illegible]



Mechanical / Electrical Basis of Design Narrative
Surgical Services Addition and Renovations

Prepared For:
Brattleboro Memorial Hospital
Brattleboro, VT 05301

September 24, 2015
updated February 3, 2016

F&T Project No. 150030.01

Prepared By:

Fitzmeyer & Tocci Associates, Inc.
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Woburn, MA 01801
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1. Project Description

1.1. General

The proposed addition to the Brattleboro Memorial Hospital consists of a 4-story 33,000 square foot new construction addition in the approximate location of the existing Pavilion Building portion of the facility. The ground floor of the addition is intended to contain CSR and surgical support spaces as well as a cardiac rehab suite. The first floor of the addition is intended to contain 3 Operating Room suites, sterile core and associated support spaces. The second and third floors are planned to medical office suites.

The renovations consist of modifications to approximately 12,000 square feet of existing inpatient space on the first floor, with renovations to PACU, prep/recovery, Endoscopy, and surgical support areas. The medical office suites will occupy the 1st and 2nd levels and will include primary care exam, treatment, rehabilitation, pharmacy as well as associated administrative, waiting and support spaces.

Existing utilities serving the Richards Building and the West-Wing are routed via the ground floor corridor that is proposed to be demolished and re-built. The existing utilities shall be removed and replaced as required to accommodate this work.

The building, like the rest of the existing hospital facility, is expected to operate approximately 24 hours / day, seven days / week. The operation of the addition's second and thirds floors may have more limited hours consistent with outpatient type services.

Base infrastructure building utilities shall be provided by the proposed campus plant.

The project shall be designed to comply with the requirements of the FGI Guidelines for Healthcare Design and Construction, applicable state and local codes and facility standards.

2. Mechanical / Electrical Systems Executive Summary

2.1. Fire Protection

A complete wet-pipe automatic sprinkler fire protection system shall be provided for the addition, including a new standpipe system, extended from the existing building fire service entrance. The existing hospital facility water service shall support the flow requirements of the addition sprinkler system and hose valves. The existing fire protection systems serving the areas of the building proposed to be renovated are adequate in capacity and shall remain in service, with required modifications and / or extensions to support new space function and layout. No additional fire pump requirement is currently anticipated for the building. Coverage throughout the building shall be designed to fully comply with the requirements of NFPA 13 & 14 and the Owner's Insurer (Factory Mutual Global).

2.2. Plumbing

Complete domestic water, sanitary drainage and venting, storm drainage, medical gas and vacuum and propane gas systems shall be provided for the addition. The domestic water system, supported by an extension of the existing building municipal water service, shall consist of cold, hot and re-circulation piping systems. Domestic hot water shall be provided via steam-fired instantaneous water heating equipment. New sanitary drainage and storm water drainage systems shall be provided to support the proposed addition; piping below grade shall be extended from and tie into the associated site locations. Existing domestic water, sanitary drainage and venting and storm drainage systems serving the areas of the building proposed to be renovated are adequate and shall remain in service, with required modifications and / or extensions to support new space function and layout. Liquid

propane gas shall be extended from the existing building propane tanks to support the building's equipment gas requirements. Centralized medical air, oxygen and medical vacuum systems, supported by extensions of the existing building systems, respectively, shall be provided with associated master, local and area alarms and zone boxes. The existing nitrogen system shall be upgraded to support the existing facility and the requirements of the addition and renovation. All systems shall be designed to fully comply with the requirements of NFPA 99 & NFPA 55, the 2014 FGI Guidelines for Healthcare Design & Construction, and all applicable local and state codes and regulations. Plumbing fixtures shall be provided that meet current Energy Policy Act and Efficiency of Vermont water conservation requirements and are consistent with facility standards.

2.3. HVAC

The boiler plant will be renovated with new boilers, a fuel system and ventilation systems. The boiler plant renovation will be phased to minimize down times to the steam system. A new stand-alone boiler system will be provided for central sterile process loads. A new hot water heat exchanger and pumping system will be provided to serve the reheat needs for the new addition. An existing 177 ton chiller will be removed and replaced with a new 270 or 300 ton air cooled roof mounted chiller.

Complete supply, return, exhaust, hot water heating and three new air handling systems shall be provided for the addition and renovation areas. The existing air handler serving the operating rooms and central sterile will be replaced with a new unit to serve the new PACU, ACU and endoscopy areas as well as the existing support areas not in scope. Automatic control systems shall be supported by a direct digital control based building automation system.

All areas within the building shall be provided with systems designed to comply with the 2010 FGI Guidelines for Healthcare Design and Construction and applicable local and state codes and regulations.

2.4. Electrical

The proposed addition and renovation areas shall be served from the existing building's electrical distribution infrastructure. Normal power and essential/emergency power shall be provided by the existing switchboard in the main electrical room and the recently upgraded essential electrical distribution equipment, also located in the main electrical room. New normal and emergency panelboards and branch distribution shall be provided for service to loads throughout the new addition. Emergency distribution shall be separated into critical, life safety, and equipment branches, and this equipment located in dedicated emergency electric closets. New normal and emergency power distribution shall support all power, lighting, and equipment requirements. Lighting systems shall be energy efficient LED type fixtures and provided with automatic relay control, and occupancy sensing controls (where appropriate). Low voltage systems shall include new fire alarm, security, nurse call systems, and telephone and data infrastructure systems.

All areas within the building shall be provided with systems designed to comply with the FGI Guidelines for Healthcare Construction, NEC 2014 Edition, NFPA 99 Health Care Facilities Code, and Efficiency Vermont energy conservation standards. Fixtures and devices throughout shall be designed as appropriate for the space function and population.

3. Fire Protection Systems

3.1. System Description

A complete wet-pipe automatic sprinkler fire protection system shall be provided. The new sprinklers and piping shall be configured as a combination automatic wet sprinkler / Class I manual standpipe system with fire hose valves in each stairwell as required by the Brattleboro Fire Department.

An approximately 150 foot main shall be extended from the existing fire protection water service which enters at the north side of the main building. Concealed sprinklers shall be provided throughout the building, except in any area to be constructed without a ceiling, where upright sprinklers shall be provided. Sidewall sprinklers shall be provided at elevator shafts and also as required. No new fire department connection requirement is anticipated for the building.

Based on the proposed building configuration and the available water supply at the building water entrances (2010 data), no fire pump requirement is anticipated for the addition. The standpipe is required per the 2009 IBC. NFPA 14 allows non-high rise buildings to have manual wet standpipes, relying upon the fire department pumper as the source of flow and pressure, in lieu of a fire pump. Factory Mutual Data Sheet 4-4N, which requires automatic standpipes, is not applicable to the proposed building configuration (less than five stories).

An existing sprinkler main serving the Richards Building is routed via the ground floor corridor that is proposed to be demolished and re-built. The existing main shall be removed and replaced, with the appropriate expansion joints. During construction, temporary sprinkler water service to the Richards Building shall be maintained.

Distribution of sprinkler heads shall generally be based on Light Hazard and Ordinary Hazard criteria, as applicable based on space function, in accordance with NFPA 13. Quick-response sprinklers shall be used to the maximum extent possible. Design densities shall be as directed by NFPA, FM Global, and the Brattleboro Fire Department.

All spaces shall have sprinkler protection. The fire protection system shall be hydraulically designed, furnished and installed by the fire protection subcontractor. The engineer shall prepare design drawings and hydraulic calculations, suitable to obtain a building permit. Working drawings shall be provided by the fire protection subcontractor showing all sprinklers and piping, stamped by a registered professional engineer and forwarded to the local fire department for approval.

3.2. Materials

Piping above ground:

- Black steel pipe: Schedule 40, ASTM A53, threaded and / or grooved joint fittings; minimum working pressure 200 PSI.
- Thin-wall black steel pipe: ASTM A 135 or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10.

3.3. Proposed Manufacturers

Sprinklers:	Viking; Tyco; Reliable; approved equal.
Alarm Valve & Trim:	Viking; Reliable; Automatic Fire Protection Corp.; approved equal.
Piping:	Allied; Wheatland; Central; approved equal.
Flow and Supervisory:	McDonnell; Autocall; Potter Romer; approved equal.

4. Plumbing Systems

4.1. Domestic Water Systems

A complete domestic water system shall be provided at the addition, extending to all fixtures and equipment requiring hot and / or cold water. The system shall consist of a 2" cold water main extended from the adjacent existing hospital building, with dedicated meter. No new water treatment requirement is anticipated.

Domestic hot water heating at the addition shall be provided via two steam-fired instantaneous water heat exchangers, located within the 1st floor mechanical space above the boiler room. Multiple thermostatic mixing valves shall be provided to regulate hot water temperature as applicable to the

associated equipment. The water heaters shall have an individual 10 GPM capacity. Hot water circulation pumps are anticipated to be 2 GPM @ 25' of head each in a lead / lag configuration. The domestic water piping and circulation system shall support all plumbing fixtures and equipment requiring domestic water. The anticipated HW load would require a 1" main piping distribution throughout the space.

Make-up water for HVAC applications and any other potentially contaminated service shall be provided with a local backflow preventer.

Existing domestic water systems serving the areas proposed to be renovated shall be modified and extended as required.

Piping shall be sized based on fixture units and velocity within the pipe. Water velocity shall not exceed 8 feet / second. Cold water piping shall be insulated with 1/2" thick insulation. Hot water and re-circulation piping shall be insulated with 1" insulation, or as required by local energy code.

4.2. Sanitary Drainage and Venting Systems

A complete sanitary drainage and venting system shall be provided at the addition, extended and connected to all fixtures and equipment as required. The system shall extend 5' from the building foundation wall prior to connecting to the site sanitary sewer. Venting shall terminate through the roof at multiple locations. In-direct sanitary drainage connection and cool down shall be provided for any water discharge above 140°F.

Based on the proposed building configuration and adjacent site conditions, no ejector pump requirement is anticipated for the addition.

Existing sanitary drainage and venting systems serving the areas proposed to be renovated shall be modified and extended as required.

4.3. Storm Drainage Systems

A complete storm drainage system shall be provided at the addition, extended and connected to all roof drains. The system shall extend 5' from the building foundation wall prior to connecting to the site drainage sewer.

Horizontal storm drainage piping shall be insulated with 1" thick insulation. Vertical piping risers shall not be insulated.

Based on the proposed configurations locating the renovation areas multiple levels below the roof, no requirement for modification / extension of the existing storm drainage systems serving the areas proposed to be renovated is anticipated.

4.4. Special Drainage and Venting Systems

No requirement for special drainage and venting is anticipated to be required.

4.5. Medical Gas and Vacuum Systems

A complete medical air system shall be provided at the addition, extended from the existing medical air source equipment located in the facility mechanical room. The piping system shall be extended and connected to all valve boxes and medical air outlets, per NFPA 99 requirements.

A complete oxygen system, located on site, shall be provided at the addition, per NFPA 55 requirements, extended from the existing bulk oxygen storage equipment located on site and distributed within the existing facility. The piping system shall be extended and connected to all valve boxes and O₂ outlets, per NFPA 99 requirements.

A complete medical vacuum system shall be provided at the addition, extended from the existing medical vacuum equipment located in the facility mechanical room. The piping system shall be extended and connected to all valve boxes and medical vacuum inlets, per NFPA 99 requirements.

Existing medical air, oxygen and medical vacuum mains serving the Richards Building are routed via the ground floor corridor that is proposed to be demolished and re-built. The existing mains shall be removed and replaced, with the appropriate expansion joints. During construction, temporary medical gas and vacuum service to the Richards Building shall be maintained.

A complete instrument air system shall be provided, via a 7.5 hp duplex base-mounted system with a 120-gallon storage tank. Reserve cylinders shall be provided for at least one hour of operation. The piping system shall be extended and connected to all valve boxes and instrument air outlets, per NFPA 99 requirements.

A complete waste anesthetic gas disposal system shall be provided, via an oil-less 2 hp claw duplex system with a 60-gallon storage tank. The piping system shall be extended and connected to all valve boxes and WAGD inlets, per NFPA 99 requirements.

Complete nitrogen and nitrous oxide systems shall be provided at the addition, extended from the existing nitrogen tank manifold area located in the facility tank room. Currently, the manifolds' capacities are adequate for the facility; however the condition of the equipment is marginal. Each manifold shall be replaced as required to maintain capacity to meet the requirements of the existing facility and the proposed addition and renovations. The piping system shall be extended and connected to all valve boxes and N₂ and N₂O outlets, per NFPA 99 requirements.

A complete carbon dioxide system shall be provided, via 2 x 2 high-pressure cylinder manifolds. The piping system shall be extended and connected to all valve boxes and CO₂ outlets, per NFPA 99 requirements.

Existing medical air, oxygen, medical vacuum, nitrogen and nitrous oxide piping distribution systems serving the areas proposed to be renovated shall be modified and extended as required.

Master alarm panels shall be provided at Recovery and Prep for system monitoring. Area alarm panels shall be provided with each zone valve box for distribution monitoring. Medical gas outlets shall be quick-connect type.

4.6. Propane Gas Systems

Existing propane gas piping distribution systems serving the existing boiler room shall be modified and extended as required to suit the new burner equipment.

4.7. Reverse-Osmosis Water Systems

A reverse-osmosis water generator skid shall be provided with supply and return loop piping extended to sterilization and humidification equipment as required. The skid shall be located in a lower level mechanical space.

4.8. Plumbing Fixtures

Plumbing fixtures shall be provided at the addition and renovation areas complete with all trim, accessories and necessary piping connections. Fixture types and operators shall be consistent with FGI Guidelines, local and other applicable codes and facility standards.

In general, fixtures shall be provided as required by the architectural layout:

- Clinical exam / treatment and support (lab) spaces shall be provided with stainless steel counter sinks with gooseneck faucets and wrist blade operators.
- Toilet rooms shall be provided with vitreous china water closets and lavatories with gooseneck faucets and wrist blade operators.
- Scrub sinks with electronic faucets shall be provided for operating rooms.

- Soiled utility spaces shall be provided with flushing rim sinks and eyewash stations.
- Housekeeping spaces shall be provided with floor-mounted mop sinks.
- Floor drains shall be provided with automatic trap primers.

4.9. Materials

Piping:

- Domestic water: Type L copper, hard drawn, solder fittings; full port, ball type, solder end fixture isolation valves.
- Sanitary waste and venting, 2-1/2" and larger, above grade: Hubless cast-iron.
- Sanitary waste and venting, 2" and smaller, above grade: Cast-iron or type L copper, threaded or solder fittings.
- Sanitary waste and venting, below grade: Hub and spigot.
- Storm drainage, above grade: Service weight hubless cast-iron, four-band (minimum) heavy-duty clamp / gasket mechanical joints.
- Storm drainage, below grade: Service weight hub and spigot cast-iron, rubber seals.
- Propane gas: Schedule 40 black steel, ASTM A53, shop-applied pipe coating on exterior installations only.
- Reverse-osmosis water: Stainless steel, threaded fittings.
- Medical gas: Type L copper, pre-washed and sealed, brazed fittings.
- Equipment air: Type L copper, wrought copper fittings and 95-5 lead-free solder fittings.
- Medical vacuum & WAGD: Type L copper, pre-washed and sealed, brazed fittings.

4.10. Proposed Manufacturers

Toilets:	Toto; American Standard; Kohler; approved equal.
Flush Valves:	Toto; Delaney; Sloan; approved equal.
Sinks:	Just; Elkay; Opella; approved equal.
Faucets:	Chicago; Delta; Toto; approved equal.
Eyewash:	Guardian; Haws; Speakman; approved equal.
Floor Drains:	JR Smith; Wade; Mifab; approved equal.
Roof Drains:	Froet; JR Smith; Wade; approved equal.
Valves:	Apollo; Watts; Nibco; approved equal.
Backflow Preventers:	Apollo; Watts; Febco; approved equal.
Showers:	Aquatic; Aqua Bath; Aquarius; approved equal.
Water Heaters:	Patterson Kelly; PVI; approved equal.
Medical Gas and Vacuum:	Beacon Medaes; Allied; Amico; approved equal.

5. HVAC Systems

5.1. Design Criteria

The ambient outdoor design criteria will be based on the W.H. Morse State Airport data as follows:

- Summer Cooling (0.4%): 86.0° DB, 72.3°F WB
- Summer Dehumidification (0.4%): 79.8°F DB, 74.6°F WB
- Winter Heating Design (99.6%): -4.4°F DB
- Winter Humidification (99.6%): -2.0°F DB, -3.5°F WB

The indoor design criteria will be as follows:

Room Type	Summer	Winter
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	°F	%	°F	%
Recovery	72	50	70	30
Operating Rooms	64	50	64	30
Procedure	72	50	70	30
Sterilization	72	50	70	30
All Other	72	50	70	*

*All other spaces will have no winter humidification

5.2. Heating

5.2.1.Steam

Primary heating at the building is currently generated at the existing boiler plant. Three (3) oil fired fire tube boilers provide high pressure (75psig) steam which is used for heating and process loads throughout the campus. One boiler is a 100 BHP Cleaver Brooks model and two are 150 BHP Kewanee models. Currently the hospital is phasing out the steam fed clothes dryers which is anticipated to be removed from the boiler system prior to the project starting. The steam serving the central sterile area is also being removed from the main boiler plant as part of the project. Elimination of these two loads would remove the requirement for high pressure steam from the facility and therefore we propose that the new boilers would be low pressure steam.

The anticipated load of the boiler plants including the new surgery addition is 300 BHP therefore our recommendation is to provide three (3) new 200 BHP fire tube boilers during two separate phases. This will allow two boilers to operate as the duty with excess capacity and one as the standby for full redundancy. Each boiler will have an 8:1 turndown for an operational turndown of 16:1.

The anticipated load of the boiler plants including the new surgery addition is 300 BHP therefore our recommendation is to provide three (3) new 200 BHP, no. 2 oil-fired, fire-tube boilers during two separate phases. This will allow two boilers to operate as the duty with excess capacity and one as the standby for full redundancy. Each boiler will have an 8:1 turndown for an operational turndown of 16:1.

It is estimated that the Dunham building requires 280 lbs/hr of low pressure steam and therefore the recently replaced 2" underground line is sufficient to keep serving the building.

The Richards building line is in the way of the new addition and will be replaced with an appropriately sized line during that period of construction.

The existing low pressure steam and low pressure condensate lines in the ground floor corridor will be reworked to support the renovations to the corridor.

5.2.2.Boiler Feed System

The recently installed deaerator has a capacity of 15,000 lbs/hr which exceeds the 13,800 lb/hr (400 BHP) load anticipated at the completion of the renovations. The load, however, will exceed the recommended storage capacity of the deaerator and therefore a new 300 gallon surge tank will be provided. The addition of a surge tank will also ensure that a constant flow of water is being supplied to the deaerator and provide smoother operation.

Two new boiler feed pumps on VFD's in a duty-standby configuration would be provided for the new boilers, however possible re-use of the recently replaced pumps will be examined.

The existing condensate receiver will be maintained.

5.2.3. Fuel System

The existing No. 4 fuel oil system including the pumps and heaters will be removed and replaced with a No. 2 fuel oil system. The oil tanks will be drained and cleaned.

It may be possible to convert the 100 BHP boiler to No. 2 fuel oil during Phase 1 and thus allow the immediate removal of the existing fuel oil pump set and permit drain down and cleaning of both fuel oil tanks simultaneously. The cost and feasibility of this is being investigated.

5.2.4. Hot Water

Steam is also used to generate heating hot water. The renovation area currently utilizes hot water for all reheating needs. The existing heat exchanger serving the renovation area is located in a second floor mechanical room and has 4" supply and return piping feeding the existing building. The heat exchanger and circulating pumps provide 195 GPM of 50% propylene glycol water at 180-160°F.

The existing heating hot water system will be reconfigured to serve the ACU/PACU new VAV boxes. The system will also be extended to serve the new Endoscopy suite VAV reheats and the replacement unit AHU-2.

A new hot water heating system will be provided to serve the addition. A mechanical room on the ground floor, adjacent to the boiler plant, will be provided. The plant will consist of redundant shell and tube heat exchangers, redundant circulating pumps, an air separator, expansion tank and chemical feeder. It is anticipated that the system will be 150 GPM.

5.3. Primary Cooling

The existing building is served by two air cooled, roof mounted chillers. CH-1 was recently replaced and has a capacity of 225 tons. CH-2 is 20 years old and has a capacity of 177 tons. It is understood from discussions with facility staff that only one chiller is required to operate to meet the current cooling load, giving the plant partial redundancy. The renovation net add to the chilled water system is anticipated to be 15 tons plus another 30 tons for the kitchen coil replacement project for a total of 45 tons. This will raise the peak chiller demand to 270 tons. A new roof mounted air cooled screw chiller will replace CH-2 to provide capacity to meet the new loads. The first option is a 270 ton (nominal 290 ton) chiller which will meet the load with no reserve capacity. The second option is a 300 ton (nominal 330 ton) chiller which will meet the load and have an extra 10% (30 tons) of capacity for future expansion to the chilled water system.

The new chiller will feature dual refrigerant circuits, each powered separately. One circuit will be on standby power.

Chilled water supply and return pipe branches from the loop shall be extended to the new addition roof. All controls shall be on the building's emergency power system. The major chilled water mains going to the new addition roof are estimated to be 4" with 2" thick fiberglass or cellular insulation.

The 3" chilled water supply and return pipes in the ground floor corridor will be reconfigured to support the renovations to the corridor.

AHU-1 will have a DX cooling coil and companion condensing unit to serve as the dehumidification coil. The condensing unit will be an air cooled unit located near the air handler. The condensing unit is anticipated to be 35 tons.

5.4. Humidification

All scope areas will be humidified. Each air handler will have a steam-to-steam humidifier utilizing plant steam to generate steam for distribution. There will be no plant steam directly injected into the airstream.

Areas requiring humidification beyond the 30% RH that the air handlers will provide will have local electric ionic bed type humidifiers. The generator cabinet will be wall mounted adjacent to the space and will feed duct mounted dispersion tubes.

5.5. Air Handling

Cooling, ventilation, and ventilation air pre-heating shall be provided by three (3) air handling units located on the roof; two on the new addition roof and one on the existing OR roof. The air handlers shall be hospital-grade units with durable components.

The recovery and endoscopy unit, AHU-1, shall have the following characteristics:

- Dedicated to first floor endoscopy suite, recovery area and areas currently served by AC-1 not being renovated.
- 7,000 CFM supply/return air flow
- Semi-Custom Unit
- 2.5" external static pressure supply and 2" external static pressure return performance.
- Variable air volume.
- 33% outside air.
- All sections welded-frame, double-wall, aluminum exterior, aluminum interior, 2" foam insulated panel construction with thermal breaks. Exterior surface shall be factory painted.
- Stainless steel drain pans and coil racks
- Interior drains in all sections.
- Factory-mounted and -wired disconnect switches.
- Factory-wired interior and service lights and receptacles.
- Premium efficiency motors.
- Variable speed drives for individual control of all fans.
- Access doors and windows in all sections.
- Airflow measuring stations (supply, return, and outside air).
- Filter bank differential pressure gauges.
- Fully redundant supply and return fans with plenum dividers.
- Ultra-low-leakage dampers.
- Duct smoke detectors (supply and return).
- 30% efficient, MERV 8 pleated pre-filters.
- 90% efficient, MERV 14 cartridge final filters.
- Hot water heating coils.
- Chilled water hydronic cooling coils.
- UV lights for cooling coils
- Steam-to-steam humidifier
- Discharge Plenum.
- Air handler and controls shall be on emergency power.
- Estimated footprint: 7'-2" W x 40' L x 4'-6" H (not including support).
- Estimated weight 9,500 lbs

The operating room suite air handling unit, AHU-2, shall have the following characteristics:

- Dedicated to three OR's and support spaces on first floor and central sterile on ground floor
- 10,000 CFM supply/return air flow
- Custom Unit
- 3.0" external static pressure supply and 2.5" external static pressure return performance.
- Variable air volume.
- 20% outside air.

- All sections welded-frame, double-wall, aluminum exterior, aluminum interior, 2" foam insulated panel construction with thermal breaks. Exterior surface shall be factory painted.
- Stainless steel drain pans and coil racks
- Interior drains in all sections.
- Factory-mounted and -wired disconnect switches.
- Factory-wired interior and service lights and receptacles.
- Premium efficiency motors.
- Variable speed drives for individual control of all fans.
- Internally spring isolated fans.
- Access doors and windows in all sections.
- Airflow measuring stations (supply, return, and outside air).
- Filter bank differential pressure gauges.
- Fully redundant supply and return fans with plenum dividers.
- Ultra-low-leakage dampers.
- Duct smoke detectors (supply and return).
- 30% efficient, MERV 8 pleated pre-filters.
- 90% efficient, MERV 14 cartridge mid-filters.
- 99% efficient, HEPA final filters.
- Hot water heating coils.
- Chilled water hydronic cooling coils.
- DX dehumidification coil with companion air cooled condensing unit.
- UV lights for cooling coils
- Steam-to-steam humidifier
- Discharge Plenum.
- Air handler and controls shall be on emergency power.
- Estimated footprint: 7'-2" W x 52'-10" L x 5'-4" H (including ACCU, not including support).
- Estimated weight 18,000 lbs (including 4,400 lb ACCU)

The medical office unit, AHU-3, shall have the following characteristics:

- Dedicated to ground floor cardiac gym, second floor MOB and third floor MOB
- 11,500 CFM supply/return air flow
- Semi-Custom Unit
- 3.0" external static pressure supply and 2" external static pressure return performance.
- Variable air volume.
- 33% outside air.
- All sections welded-frame, double-wall, aluminum exterior, aluminum interior, 2" foam insulated panel construction with thermal breaks. Exterior surface shall be factory painted.
- Stainless steel drain pans and coil racks
- Interior drains in all sections.
- Factory-mounted and -wired disconnect switches.
- Factory-wired interior and service lights and receptacles.
- Premium efficiency motors.
- Variable speed drives for individual control of all fans.
- Access doors and windows in all sections.
- Airflow measuring stations (supply, return, and outside air).
- Filter bank differential pressure gauges.
- Fully redundant supply and return fans with plenum dividers.
- Ultra-low-leakage dampers.
- Duct smoke detectors (supply and return).
- 30% efficient, MERV 8 pleated pre-filters.

- 90% efficient, MERV 14 cartridge final filters.
- Hot water heating coils.
- Chilled water hydronic cooling coils.
- UV lights for cooling coils
- Steam-to-steam humidifier
- Discharge Plenum.
- Air handler and controls shall be on emergency power.
- Estimated footprint: 7'-2" W x 43'-3" L x 5'-4" H (not including support).
- Estimated weight 8,900 lbs

5.6. Supply Air Distribution System

New supply air ductwork shall generally be galvanized steel and insulated with 2" thick fiberglass duct insulation. Stainless steel ductwork shall be used for service to operating and procedure rooms as well as up and down stream of duct mounted humidifiers. Medium pressure supply air ductwork between the air handler and the VAV terminal boxes shall be rated for 6" wg pressure class service. Supply air ductwork downstream of VAV terminal boxes (low pressure) shall be rated for 2" wg service.

Pressure independent variable air volume (VAV) terminal boxes with hot water reheat coils shall be provided for air flow, space pressure and temperature control. All VAV boxes shall be single inlet type with hospital grade lining and factory sound attenuators.

VAV terminal boxes serving areas such as offices, corridors, lounges and staff areas shall operate in variable volume fashion with airflow modulating in response to the thermal load within the space. Minimum air flow rate shall be defined as the minimum flow required for compliance with building code minimum ventilation air flow.

VAV terminal boxes supporting patient general care areas shall operate in variable volume fashion with airflow modulating in response to the thermal load within the space. Minimum air flow rate shall be defined as the minimum flow required for compliance with ASHRAE 170 criteria. The following are applicable minimum air exchange and ventilation rate requirements for the typical project spaces:

Space Name	Min. Total ACH	Min. Vent. ACH	Pressurization
Laboratory	6	2	Negative
Treatment Room	6	2	Neutral
Exam Room	6	2	Neutral
OR	25	5	Positive
Patient / Obs. Room	6	2	Neutral
Endo/Procedure Room	15	3	Positive
Endoscopy Cleaning	10	NA	Negative
Soiled Utility	10	2	Negative
Clean Workroom	4	2	Positive
Toilet Room	10	NA	Negative
Housekeeping	10	NA	Negative
Mechanical	6	2	Neutral
Storage/Closet	NA	NA	Neutral
Server	2	NA	Neutral
Office	4	2	Neutral

Conference	4	2	Neutral
Corridor	4	2	Positive

Space pressure relationships shall be maintained by balancing in all areas. Procedure and isolation room spaces shall be provided with space pressurization monitors. Critical care spaces requiring precise pressure relationships shall be automatically controlled (see return air system description below for additional information).

In most areas the ceiling diffusers are anticipated to be 2'x2' and to lay in the acoustic tile ceiling grid. Common spaces such as lobbies, waiting areas and corridors may have specialized diffusers / grilles to meet the requirements of the architecture. Procedure room areas shall be provided with specialized diffuser / grille systems.

O.R. areas shall be provided with factory-built Cleansuite ceiling systems.

5.7. Return Air System

A complete ducted return air system shall be provided. A low-velocity insulated galvanized sheetmetal duct system shall run throughout the building and connect from the wall / ceiling or duct-mounted grilles in each space to the return air mains. Return air ductwork serving procedure rooms or operating rooms will be stainless steel. The return air ductwork system shall be constructed to 3" wg pressure class service. Return air ductwork serving areas with potentially high humidity and / or low space temperatures (terminal humidification areas) shall be provided with 1-1/2" fiberglass duct insulation due to the potential for condensation to form on the ductwork.

Areas requiring pressurization control such as operating rooms and procedure rooms shall have return variable air volume boxes to control room pressure.

5.8. Zoning

Each temperature control zone will have a separate VAV box based on the following criteria:

- Interior and exterior spaces shall be zoned separately.
- Exterior spaces with multiple exposures shall be zoned separately.
- No more than 500 sf per zone for interior spaces.
- Offices shall be zoned separately from Patient Care areas.
- No more than 3 private offices shall be zoned together.
- No more than 4 like patient spaces shall be zoned together.
- All critical care spaces shall be zoned separately.
- Areas shall be zoned by department. Spaces in different departments shall not be zoned together.

5.9. General Exhaust Systems

A complete ducted system shall be provided to exhaust bathrooms and housekeeping areas. A low-velocity insulated galvanized sheetmetal duct system shall run throughout the building and connect from the wall / ceiling or duct-mounted grilles in each space to the exhaust air mains and to rooftop exhaust fans. The exhaust air ductwork system shall be constructed to 3" wg pressure class service.

- EF-1 will serve the toilet rooms associated with AHU-2. It will be approximately 200 CFM.
- EF-2 will serve the toilet rooms associated with AHU-3. It will be approximately 1200 CFM.

5.10. Specialized Exhaust Systems

Areas performing specialized procedures and as required by the FGI guidelines shall be provided with individual dedicated exhaust systems. Equipment such as fume hoods, bio-safety cabinets, and chemical storage cabinets, etc. are expected to require dedicated exhaust systems.

- EF-3 will be dedicated to the endoscopy scope cleaning room. It will be approximately 250 CFM.
- EF-4 will be dedicated to the central sterilizer. It will be approximately 800 CFM.

5.11. Automatic Temperature Controls

The entire system shall be controlled by a Direct Digital Control building automation system. The control system shall provide the primary function of temperature control throughout the facility. In addition, the system shall allow for problems to be identified. Alarms, scheduling and troubleshooting may take place at a remote location. Facility staff may monitor, troubleshoot and adjust the HVAC system, solving many problems remotely. A new campus front end shall be provided at the facility office.

5.12. Materials

Piping:

- Piping 2-1/2" and larger: Schedule 40 welded steel, welded steel fittings, iron valves.
- Piping 2" and smaller: Type L copper, soldered fittings, threaded bronze valves.

Ductwork:

- ASTM A525 galvanized steel sheet, lock forming quality, zinc coating of 1.25 oz per sq ft for each side in conformance with ASTM A90.
- ASTM A167 316 Stainless steel sheet, 22 gauge annealed finish.
- Fabricated in accordance with SMACNA pressure class 6 duct standards for medium-pressure supply, class 2 for low-pressure supply, and class 3 for return and exhaust systems.

Identification:

- Piping shall be labeled per ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, colors, length of color field and viewing angles of identification devices for piping.
- Ductwork shall be labeled with plastic duct tape markers.
- Equipment shall be labeled with engraved plastic laminated equipment placards.

5.13. Proposed Manufacturers

Air Handlers:	Haakon; Trane; York; approved equal.
Pumps and Accessories:	B&G; Armstrong; Taco; approved equal.
VAV Terminals:	Titus; MetalAire; JCI/Envirotech; approved equal.
Humidifiers:	Armstrong; Nortec; Dri-steem; approved equal.
Diffusers / Grilles:	Titus; MetalAire; Krueger; approved equal.
Fans:	Greenheck; Cook; Penn; approved equal.
Terminal Heating Units:	Sterling; Airtherm; approved equal.
Controls:	JCI; Honeywell; approved equal.

6. Electrical Systems

6.1. General

Electrical work consists of an underground electrical service from the existing normal and emergency electrical distribution systems, normal and essential power panelboards, branch circuits, lighting, fire alarm, and low-voltage system components.

The electrical system throughout the building shall be in compliance with NEC Article 517 Health Care Facilities and the FGI Guidelines for Healthcare Design and Construction, NFPA 99 Health Care Facilities Code, and Vermont State Department of Health requirements.

6.2. Electrical Service – Normal

Normal electrical service shall be provided underground from a new 208Y/120 Volts, 3-phase, 4-wire feeder from the existing normal distribution system.. Preliminary calculations have determined the service required for the new addition is 600Amps, at 208Y/120 Volts, 3-phase, 4-wire. .

Power shall be distributed throughout the building from a 600 Amp, 208Y/120 Volts, 3-phase, 4-wire distribution panel to be located on the ground floor.

208Y/120 Volts, 3-phase, 4-wire panelboards shall be fed from the switchboard for the normal electrical system. Two 100A, 42-pole panelboards shall be provided for the ground floor; one for the rehab area and one serving central sterile. One 100A, 42-pole panelboard shall be provided for the 1st floor. One 200A, 84-pole panelboard shall be provided for each of the 2nd and 3rd floors.

6.3. Electrical Service – Essential

The essential electrical system shall consist of a 208Y/120 Volts, 3-phase, 4-wire feed from the existing emergency distribution system and connected to new emergency power distribution panels located in the new emergency electric room. The emergency distribution panel shall provide essential power to downstream distribution panels located in the ground floor. The essential power system shall be separated into life safety, critical, and equipment branches. A distribution panel shall be provided for each branch of the emergency electrical system, and these distribution panels shall feed 208Y/120 Volts, 3-phase, 4-wire panels throughout the addition that serve the branch circuit requirements.

The distribution panels shall be sized as follows, which includes new circuit breakers installed in existing main distribution panels (in the main electric room) and feeders to serve the new panels:

- Life Safety - 100 Amps
- Critical - 400 Amps
- Equipment - 1000 Amps

The life-safety panelboard shall serve branch circuits of that system for all floors of the addition.

For the critical branch, panelboards shall be located as follows. One 200A, 84-pole panelboard shall be provided to serve the ground floor (both rehab & central sterile). One 200A, 84-pole panelboard shall be provided to serve the 1st floor. One 100A, 42-pole panelboard shall be provided to serve both the 2nd and 3rd floors.

For the equipment branch, the distribution panel on the ground floor shall serve the majority of the major loads in the addition, including;

- New air handlers (qty 3, including new AHU on existing roof)

- New mechanical equipment in ground level mechanical room; a 400A panelboard shall be provided in the mechanical room to serve this equipment
- New central sterile equipment; a 400A panelboard shall be provided to service this equipment

The essential electrical distribution infrastructure shall be separated from the nonessential, normal electrical distribution equipment and be installed within a 2 hour rated room.

The HVAC equipment shall be served from equipment branch panelboards and distribution panelboards. The replacement chiller requires two feeds from the existing main electric room. For the 270T chiller option; the existing feeders may be re-used to serve the new unit and the existing circuit breakers shall be replaced with new (qty 1) and upgraded (new trip unit, qty 1).

For the 300T chiller option; the existing feeders may be re-used to serve the new unit and the existing circuit breakers shall be replaced with new (qty 2). The existing feeder conductors shall be inspected and tested to confirm suitability for re-use. Provide alternate pricing for two new complete feeders in the event that the existing feeders are determined to be in poor condition and require replacement.

Essential electrical system feeders shall be of a listed electrical circuit protective system with a minimum 2-hour fire rating (i.e. MI Cable) as required by the NEC Article 700.

All operating rooms shall be provided with **two (2)** 7.5 kVA isolation power panels, each fed from one critical branch of the essential power system. Operating rooms shall be considered to be a wet procedure location, necessitating special protection against electric shock (i.e. isolated power systems). Each isolated power system shall be provided with a continually operating line isolation monitor that indicates total hazard current and is readily visible to indicate when the system is and is not adequately isolated from ground.

6.4. Grounding

Additional grounding shall be added for the new addition to supplement, and tie into, the existing grounding system; and will include the following:

1. A ground ring with grounding electrodes at building steel and building corners shall be installed for the new addition and connected via grounding electrode conductor. The grounding shall connect via grounding electrode conductor to the wall mounted ground bus in the main electrical room.

Each feeder and branch circuit will contain an equipment-grounding conductor in addition to phase and neutral conductors.

6.5. Lightning Protection System

A complete lightning protection system shall be provided for the new addition structure in full compliance with NFPA 780 and will include air terminals, main conductors, cross-run conductors, roof conductors, down conductors, ground rods and ground terminals.

All lightning protection conductors will be concealed and be copper.

An add alternate shall be included to provide a complete lightning protection system for the existing facility.

6.6. Wiring Methods

The minimum size wire for standard 120 Volt, 20 ampere circuits shall be #12 AWG. The minimum size wire for any special purpose receptacles shall be #10 AWG. All lighting and power circuits shall be provided with dedicated neutral.

All wiring devices shall be hospital grade, tamper resistant type. Receptacles with integral 5mA ground fault protection shall be provided for devices within 6' of sinks, restrooms, roof, wet locations, and kitchens. Special purpose receptacles shall be provided as required by the program. Dedicated circuits shall be provided where required by the load.

The power distribution infrastructure shall limit voltage drop on feeders to 2 percent and voltage drop on branch circuits to 3 percent. Feeders and branch circuits shall be upsized as required.

Normal indoor concealed or exposed feeders shall be provided in rigid steel conduit, IMC, or EMT with copper conductors; type THHN-THWN insulation.

Conductors for the Isolation Power System shall be type XHHW or XHHW-2

Essential (Life Safety and Critical) indoor feeders shall be within a 2 hour rated enclosure or fire rated cable assembly (i.e. MI cable).

Normal only branch circuits shall consist of insulated copper conductors in raceway and shall be provided as follows:

1. Concealed – Electrical Metallic Tubing (EMT) with copper conductors; type THWN-2 insulation; minimum size #12AWG conductors. Hospital-grade type AC cable with a full-size green grounding conductor; minimum size #12AWG conductors shall be permissible with written permission from local AHJ. If type AC cable is permitted all homeruns shall be run in EMT from the panelboard to a junction box in the room being served and AC cable run from the junction box to the devices. No horizontal runs of type AC shall be permitted.
2. Exposed – Rigid galvanized steel (RGS) with copper conductors; type THWN-2 insulation; minimum size #12AWG conductors.

Essential (Life Safety and Critical) branch circuits shall be provided as follows:

3. Concealed – Electrical Metallic Tubing (EMT) with copper conductors; type THWN-2 insulation; minimum size #12AWG conductors.
4. Exposed – Rigid galvanized steel (RGS) with copper conductors; type THWN-2 insulation; minimum size #12AWG conductors.

Branch circuits shall be provided as follows:

5. Lighting Branch Circuits – 20Amp 120V 1Ph 2W branch circuits shall serve no more than 1500 Watts of lighting load.
6. General Receptacle Branch Circuits – 20Amp 120V 1Ph 2W branch circuits shall serve no more than 1400 Watts of hospital grade receptacle load assuming 200 Watts per hospital grade receptacle.
7. Computer Receptacle Branch Circuits – 20Amp 120V 1Ph 2W branch circuits shall serve no more than 1200 Watts of receptacle load assuming 400 Watts per receptacle.

Mechanical control power shall be provided as follows:

1. One (1) dedicated 20Amp 120V 1Ph 2W branch circuit for every 2,500SF.

Mechanical Equipment – A dedicated branch circuit shall be provided to accommodate the specific power requirements of each mechanical unit.

Fire Alarm – All fire alarm equipment shall be powered from the emergency (LS) system.

Elevators – Elevators for general circulation shall be powered from the elevator distribution system fed from normal power only. Elevators dedicated to the OR's and CSR shall be powered from the essential power system (equipment branch).

6.7. Lighting

Lighting shall ultimately be determined via coordinated effort between architects and engineer but the following are some basic lighting concepts:

1. Conference Rooms – Recessed mounted linear LED fixtures combined with LED down lights.
2. Corridor (Back of House) – Recessed 1'x4', 2'x4', or 2'x2' LED fixtures with 0.125" acrylic prismatic lenses and LED exit signs.
3. Corridor (Public) – Recessed, fully lensed, direct/indirect 1'x4', 2'x4', or 2'x2' LED fixtures, indirect LED lighting, and LED edge lit exit signs.
4. Lobby – Large diameter, pendant-mounted decorative LED fixtures and supplemental LED down lights.
5. Waiting Rooms – LED downlights and LED wall sconces.
6. Toilet Rooms – Recessed LED cove along toilet/urinal wall supplemented by LED down lights.
7. Stairwell – 18-24 inch diameter semi-recessed wall mounted LED fixture-two per landing-one on each end and one between each landing.
8. Exam Rooms/Treatment Rooms/Offices/Workrooms – Recessed, fully lensed, direct/indirect 1'x4', 2'x4', or 1'x4' LED fixtures, supplemented by LED recessed downlights. Under cabinet task lighting will be provided on the underside of cabinets.
9. Specialty Rooms – Each will receive LED lighting designed to best aid patient comfort and staff performance. Operating room LED lighting shall be asymmetrical operating room troffers meeting MilStd461 requirements.
10. Utility Rooms/Closets – 4 foot LED industrial pendants with 20% up-light and wire guards.
11. Illuminated Exit Signs – LED edge-lit type, except in "back-of house areas" where standard white polycarbonate LED exit signs will be used.

The majority of the lighting fixtures shall be LED, 120-volt. All lamps/LED's shall be 3500°K, CRI 85 unless otherwise noted.

Installed lighting and controls shall be in conformance with the lighting power allowance and requirements of State Energy Code and Efficiency Vermont. The lighting shall be selected to maximize the efficiency incentives. The lighting power density for Healthcare/Hospital occupancy type is 1.2W/ft².

In general, lighting shall be controlled by lighting relay panel(s) and local switches. Lighting in specific areas shall be controlled as follows:

1. Patient Rooms and Patient Occupied Areas – Light fixtures shall be controlled by local wall switches to allow for various levels of lighting for the patient and staff. The light fixtures shall also be controlled by a low-voltage bedside controller via the nurse call system
2. Multi-purpose/Conference Room – A lighting control system with multi-scene preset LED dimming control.
3. Corridor/Lobby/Waiting Rooms – Light fixtures will be controlled at two levels; the first level will include all of the emergency egress lighting (light lights) – the second level will include

- switched corridor/lobby/waiting light fixtures. Emergency egress lighting will remain ON 24-hours a day, approximately every fourth or fifth light fixture and all exit signs. Switched corridor/lobby/waiting fixtures will be run through a lighting control panel and utilize an internal time clock to turn OFF and On all the common area lighting at a pre-determined time. The lighting control panels shall be daisy-chained together and utilize a low-voltage master light switch at each floor and a single master switch at the main entrance for security.
4. Toilet Rooms – Light fixtures shall be controlled by local wall switch with an integral occupancy sensor.
 5. Nurse Station – Each light fixture type shall be controlled by independent switches to allow for user adjustment of lighting levels appropriate for the task and time of day; dimmer switches shall be used.
 6. Exam Rooms/Offices/Workrooms – Light fixtures in these types of rooms shall be controlled via line-voltage switches and ceiling or wall-mounted occupancy sensors. Each room shall include dimmer switches to allow for adjustment of illumination levels. In the event the light fixtures are left ON the occupancy sensors shall shut the room down after a predetermined time period and turn ON the light fixtures when the room is re-occupied.
 7. Stairwell – Stairwell lighting shall be ON 24-hours a day, and each stair shall include two separate independent branch circuits for redundancy. Stairwell fixtures shall be dimmable and incorporate occupancy sensors to reduce lighting levels by 50% when the stairs are not in use.
 8. Physical therapy – A multiple level, switching arrangement to create at least two levels of lighting. Light fixtures shall be through a lighting control panel, which shall utilize an internal time clock to turn off and on all the lighting at a pre-determine times. The low voltage switches shall allow for override of panel controls.
 9. Utility Rooms / Closets – Light fixtures shall be controlled by local wall switch with an integral occupancy sensor.
 10. Exterior / Site Lighting – Light fixtures shall be controlled via the lighting control panel, lighting contactors, and photocell.
 11. Operating Rooms/Procedure Rooms – Lighting control shall be coordinated by dimmable wall switches.

6.8. Fire Alarm System

A fully-addressable, non-coded, microprocessor-based fire alarm system will be provided throughout the addition, and renovation areas. The system shall be an extension of the existing Honeywell/Silent Knight fire alarm system. New fire alarm panels shall be provided as required to support the system additions. The existing fire alarm master box with 24hr red light, fire alarm beacon, and a knox box located on the building exterior near the main entrance, will remain.

Fire alarm system shall be wired as a Class A system with two independent fire alarm loops/risers per floor; each loop/riser supply and return path shall be run in a one-hour fire rated enclosure for survivability. Wiring method for fire alarm conductors is type AC cable, minimum conductor size #14AWG.

Manual pull stations shall be provided at each building and floor exit. Each pull station shall be provided with a clear polycarbonate vandal cover with an integral battery-powered audible alarm initiated by opening the cover.

The sprinkler system shall be monitored via tamper and flow switches. If the tamper and flow switches are located in the ceiling behind an access panel then remote-indicating lights shall be required.

Smoke detectors with alarm verification shall be provided throughout the corridors. Standard type smoke detectors shall be provided in electrical closets and rooms, IT closets and rooms, lobbies, lounges and other common areas. Heat detectors shall be provided in the following areas - mechanical rooms, janitor's closets, and central sterile equipment spaces. All mechanical air-handling systems over 2000cfm shall be provided with duct smoke detectors and remote test/reset stations that are programmed to automatically shut down the associated air-handling system.

ADA approved speaker/strobe (75cd) units shall be provided throughout the corridors, in the stairwells and in common bathrooms. Higher candela level (110cd) speaker/strobe units shall be provided in large open areas, mechanical rooms and where required by NFPA and ADA. Strobe only units shall be provided in public and semi-private bathrooms. Strobes shall be synchronized throughout. Speaker/strobes in patient accessible areas shall be protected by tamper proof, non-looping design covers.

Fault Isolator modules shall be provided in each SLC on the Class "A" system wiring as follows:

1. Between floors.
2. One (1) fault isolator module for every 18 to 20 addressable devices.

6.9. Master Clock System

New devices shall be provided as required in exam/treatment rooms, nurse/staff work areas, and common areas as defined by the Owner. New devices shall be battery powered, analog type as manufactured by Primex and capable of interfacing with the existing wireless clock system.

6.10. Nurse Call System

An audio-visual nurse call system shall be provided throughout the addition, and renovation areas, as required to suit the requirements of each space. The system shall be an extension of the new Tek-Tone system installed during the recent Emergency Department renovation project; and will be a networked system with programming to operate as discrete local system within each nursing suite. Operating room areas, PACU, ASU, Endo, and associated areas shall be provided with audio-visual devices and functions. Exam room suites on the second and third floors of the addition will utilize tone-visual devices and functions. Code blue stations and functions will be incorporated into the nurse call system.

Typical devices such as staff assist/code blue stations, pull cord stations, patient bed stations with pillow speakers, patient stations with cord set, duty stations, dome lights, master stations and annunciators will be coordinated with user requirements.

6.11. Paging / Public Address System

Paging system and ceiling mounted speakers shall be installed in corridors, staff lounges, and waiting areas. Final locations of speakers shall be coordinated with the Architect and Owner.

Paging system shall be an extension of the existing Bogen system currently serving the facility. New components shall be added to the system to accommodate the system additions Functions include, but are not limited to, the following:

1. Multi-Zone Operation: A switch or switches may be operated for selective connection of separate zones to different channel signals.
2. Selectability of sources for amplifying sound between various microphone outlets and other inputs.

3. All-Call Operation – A single switch may be used to make an announcement to all zones simultaneously, regardless of zone or channel switch settings. When switch is released, system returns to original operating mode.
4. Telephone Paging: Ability to use the all-call function by dialing an extension from any local telephone instrument and speaking into the telephone. The system returns to original operating mode when telephone is hung up.
5. Program Signal: Internal tone generator is activated by time-controlled dry contacts in a separate clock and program system device. Tone generator produces a tone that is amplified and sounded over all speakers, overriding signals currently being distributed.
6. High-Quality Sound Reproduction: Sound is free from noised, such as pops, clicks, hisses, and hums at all loudspeakers at all times during system operation including standby mode with inputs off. System output is free from distortion and nonuniform coverage of amplified sound.

The contractor shall be responsible for providing the infrastructure required for the installation of the paging system, speakers and wiring loop via empty conduit with pull strings, cable support, and back boxes.

6.12. Raceway Support System

The contractor shall be responsible for providing the infrastructure required for distribution of the following low voltage systems:

1. Voice
2. Data
3. Video
4. Security
5. Nurse Call

The infrastructure system includes empty conduits, wireways, pull strings, back boxes, recessed floor boxes and cable tray system. Provisions for device locations shall consist of a backbox at each location and a minimum 1" conduit run to within 6" of the cable tray. Tel/data and security wiring shall be included in the contractors scope of work; and be in accordance with the facility standards for these system.

Cable tray shall be provided in all corridors back to the tele/data room. Cable tray shall be 12"x6" basket type tray, and shall be trapeze hung (not center-hung).

6.13. Proposed Manufacturers

The following manufacturers are approved for the indicated equipment:

1. Electrical Distribution: Square D (Basis of Design), Cutler Hammer, Siemens
2. Conductors: Southwire, Senator Wire, Carol Cable, American Insulated Wire Corp, Okonite, AFC, Allflex
3. Wiring Devices: Legrand-Pass & Seymour (BOD), Hubbell, Cooper
4. Device Wall Plates: Legrand-Pass & Seymour (BOD), Leviton, Hubbell
5. Fire Alarm: Silent Knight-Honeywell
6. Nurse Call: TekTone (Basis of Design), or approved equal
7. Lighting: Cooper Lighting, Axis Lighting, Lithonia Lighting
8. Cable Tray: Cooper B-Line, Cabofil, Wiremold

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BRATTLEBORO MEMORIAL HOSPITAL
RONALD READ PAVILION
MODERNIZATION PROJECT

Docket No. GMCB-001-16con

APPENDIX C

- New Construction and Renovation Costs Breakdown by Project Component and CSI Division

Attachment C - Summary

BRATTLEBORO MEMORIA HOSPITAL
Docket No. GMCB-001-16con

		4.00%		5.00%		10.00%		2.75%			
		HP Cummings Estimate	Inflation	Estimated Costs with Inflation	HP Cummings Contingency	Owners Contingency	HP Cummings CM Fee	Owners cost	Total		
#1 demolition of existing 2 story building											
	Division 1	4,938	198	5,135	257	539	163		6,094		
	Division 2	78,050	3,122	81,172	4,059	8,523	2,578		96,332		
	Division 3	0	0	0	0	0	0		0		
	Division 4	0	0	0	0	0	0		0		
	Division 5	0	0	0	0	0	0		0		
	Division 6	0	0	0	0	0	0		0		
	Division 7	0	0	0	0	0	0		0		
	Division 8	0	0	0	0	0	0		0		
	Division 9	0	0	0	0	0	0		0		
	Division 10	0	0	0	0	0	0		0		
	Division 20	0	0	0	0	0	0		0		
	Division 21	0	0	0	0	0	0		0		
	Division 22	0	0	0	0	0	0		0		
	Division 23	0	0	0	0	0	0		0		
	Division 26	0	0	0	0	0	0		0		
	Division 31	0	0	0	0	0	0		0		
	Fixed Equipment		0	0	0	0	0	0	0		
		82,988	3,320	86,307	4,315	9,062	2,741	0	102,426		

Attachment C - Summary

BRATTLEBORO MEMORIA HOSPITAL
Docket No. GMCB-001-16con

		4.00%		5.00%		10.00%		2.75%			
		HP Cummings Estimate	Inflation	Estimated Costs with Inflation	HP Cummings Contingency	Owners Contingency	HP Cummings CM Fee	Owners cost	Total		
#2 Construction of new 4 story building											
	Division 1										
	General Conditions	621,216	24,849	646,065	32,303	67,837	20,521			766,725	
	Division 2										
	Demolition	149,131	5,965	155,097	7,755	16,285	4,926			184,063	
	Division 3										
	Concrete	432,063	17,283	449,345	22,467	47,181	14,272			533,266	
	Division 4										
	Masonry	418,961	16,758	435,720	21,786	45,751	13,840			517,096	
	Division 5										
	Steel	675,969	27,039	703,008	35,150	73,816	22,329			834,303	
	Division 6										
	Woods & Plastics	181,188	7,248	188,435	9,422	19,786	5,985			223,628	
	Division 7										
	Thermal & Moisture Protection	731,440	29,258	760,698	38,035	79,873	24,162			902,767	
	Division 8										
	Doors & Windows	502,865	20,115	522,980	26,149	54,913	16,611			620,653	
	Division 9										
	Finishes	1,153,746	46,150	1,199,896	59,995	125,989	38,112			1,423,992	
	Division 10										
	Specialties	97,563	3,903	101,465	5,073	10,654	3,223			120,415	
	Division 20										
	Conveying Systems	432,063	17,283	449,345	22,467	47,181	14,272			533,266	
	Division 21										
	Fire Suppression	181,188	7,248	188,435	9,422	19,786	5,985			223,628	
	Division 22										
	Plumbing	971,444	38,858	1,010,302	50,515	106,082	32,090			1,198,988	
	Division 23										
	HVAC	2,094,528	83,781	2,178,309	108,915	228,722	69,189			2,585,135	
	Division 26										
	Electrical	1,183,851	47,354	1,231,205	61,560	129,277	39,106			1,461,148	
	Division 31										
	Sitework	550,531	22,021	572,553	28,628	60,118	18,186			679,484	
	Fixed Equipment	xxxx	0	0	0	0	0	506,165		506,165	
		10,377,745	415,110	10,792,855	539,643	1,133,250	342,808	506,165		13,314,720	

Attachment C - Summary

BRATTLEBORO MEMORIA HOSPITAL
Docket No. GMCB-001-16con

		4.00%		5.00%	10.00%	2.75%			
		HP Cumming's Estimate	Inflation	Estimated Costs with Inflation	HP Cumming's Contingency	Owners Contingency	HP Cumming's CM Fee	Owners cost	Total
#3 Renovation of existing spaces									
	Division 1	General Conditions							
	Division 2	Demolition	192,677	7,707	200,384	10,019	21,040	6,365	237,809
	Division 3	Concrete	102,927	4,117	107,044	5,352	11,240	3,400	127,036
	Division 4	Masonry	0	0	0	0	0	0	0
	Division 5	Steel	7,123	285	7,408	370	778	235	8,791
	Division 6	Woods & Plastics	7,123	285	7,408	370	778	235	8,791
	Division 7	Thermal & Moisture Protection	97,941	3,918	101,859	5,093	10,695	3,235	120,882
	Division 8	Doors & Windows	25,999	1,040	27,039	1,352	2,839	859	32,089
	Division 9	Finishes	75,860	3,034	78,894	3,945	8,284	2,506	93,629
	Division 10	Specialties	337,274	13,491	350,765	17,538	36,830	11,141	416,275
	Division 20	Conveying Systems	55,203	2,208	57,411	2,871	6,028	1,824	68,134
	Division 21	Fire Suppression	0	0	0	0	0	0	0
	Division 22	Plumbing	39,177	1,567	40,744	2,037	4,278	1,294	48,353
	Division 23	HVAC	156,706	6,268	162,974	8,149	17,112	5,176	193,412
	Division 26	Electrical	488,638	19,546	508,183	25,409	53,359	16,141	603,093
	Division 31	Sitework	245,744	9,830	255,573	12,779	26,835	8,118	303,305
			0	0	0	0	0	0	0
			1,832,392	73,296	1,905,687	95,284	200,097	60,529	2,261,598

Attachment C - Summary

BRATTLEBORO MEMORIA HOSPITAL
Docket No. GMCB-001-16con

		4.00%		5.00%		10.00%		2.75%			
		HP Cummings Estimate	Inflation	Estimated Costs with Inflation	HP Cummings Contingency	Owners Contingency	HP Cummings CM Fee	Owners cost	Total		
#4 Purchase of 3 new boilers											
	Division 1	General Conditions	99,990	4,000	103,990	5,199	10,919	3,303		123,411	
	Division 2	Demolition		0	0	0	0	0		0	
	Division 3	Concrete		0	0	0	0	0		0	
	Division 4	Masonry		0	0	0	0	0		0	
	Division 5	Steel		0	0	0	0	0		0	
	Division 6	Woods & Plastics		0	0	0	0	0		0	
	Division 7	Thermal & Moisture Protection		0	0	0	0	0		0	
	Division 8	Doors & Windows		0	0	0	0	0		0	
	Division 9	Finishes		0	0	0	0	0		0	
	Division 10	Specialties		0	0	0	0	0		0	
	Division 20	Conveying Systems		0	0	0	0	0		0	
	Division 21	Fire Suppression		0	0	0	0	0		0	
	Division 22	Plumbing		0	0	0	0	0		0	
	Division 23	HVAC	1,570,756	62,830	1,633,587	81,679	171,527	51,887		1,938,679	
	Division 26	Electrical		0	0	0	0	0		0	
	Division 31	Sitework		0	0	0	0	0		0	
			1,670,746	66,830	1,737,576	86,879	182,445	55,190	0	2,062,090	

Attachment C - Summary

BRATTLEBORO MEMORIA HOSPITAL
Docket No. GMCB-001-16con

	HP Cummings Estimate	4.00%	Estimated Costs with Inflation	5.00%	10.00%	2.75%	Owners cost	Total
		Inflation		HP Cummings Contingency	Owners Contingency	HP Cummings CM Fee		

#5 Boiler Plant Renovation								
Division 1		0	0	0	0	0		0
Division 2		0	0	0	0	0		0
Division 3		0	0	0	0	0		0
Division 4		0	0	0	0	0		0
Division 5		0	0	0	0	0		0
Division 6		0	0	0	0	0		0
Division 7		0	0	0	0	0		0
Division 8		0	0	0	0	0		0
Division 9		0	0	0	0	0		0
Division 10		0	0	0	0	0		0
Division 20		0	0	0	0	0		0
Division 21		0	0	0	0	0		0
Division 22		0	0	0	0	0		0
Division 23		0	0	0	0	0		0
Division 26		0	0	0	0	0		0
Division 31		0	0	0	0	0		0
	0	0	0	0	0	0	0	0
	13,963,871	558,555	14,522,425	726,121	1,524,855	461,269	506,165	17,740,835

% of total for each breakdown								
0.73%				726,119	1,524,855	461,269	506,165	17,740,836
90.99%				(\$2)	\$0	\$0	\$0	\$1
14.65%								

\$11,405,335 New const less GCs

Brattleboro Memorial Hospital
Modernization Project
CON Budget Cost Construction total project

Contractor
Architect

H. P. Cummings Construction Company
Lavelle Brensinger

New Construction		Renovations	
Ground Floor addition	8352 sf	Tie in at ground level	400 sf
First Floor addition	7219 sf	PACU Renovations	2180 sf
Second Floor addition	6152 sf	ENDO Renovations	1838 sf
Third Floor addition	3122 sf	Storage/Archives	1878 sf
Total Gross New Area		Corridor, mech, HVA, Toilet	922 sf
		Total Gross Renovated Area	7123 sf

NO OWNER COST IN THIS BUDGET

Based on LBA Modernization Project CON Submission January 2016

Assume 14 months for Addition

Assume 6 months for renovations

Assume 2017 construction start add 4% to cost/yr after 2017

NEW CONSTRUCTION		RENOVATIONS		TOTAL PROJECT	
SF Cost	Total Section Cost	Total Division Cost	Total Division Cost	Total Section Cost	% of Total Cost
DIV 1 GENERAL CONDITIONS					
Assume 2017 construction start add 4% to cost/yr after 2017					
Assume 6 months for renovations					
Assume 14 months for Addition					
DIV 2A Demolition					
Interior demolition					
Demo existing Pavilion North 6,216 sf @ \$13/sf					
Demo existing Pavilion South 3800 sf @ \$13/sf					
Dumsters					
Temporary partitions and setups					
Phasing					
Structural reconfigure					
MEP cut and patch					
DIV 3 CONCRETE					
Foundations					
Slabs					
Under pinning					
Site concrete					
DIV 4 MASONRY					
Interior blockwork					
Brick veneer at building exterior 13,500 sf @ \$30					
DIV 5 STEEL					
Structural steel					
Screen at roof 1,071 sf @ \$55/sf					
Air handler structure					
Roof supports					
Misc metals					
DIV 6 WOODS & PLASTICS					
Rough carpentry					
Finish carpentry & millwork					
DIV 7 THERMAL & MOISTURE PROTECTION					
Waterproof foundations					
Vapor barrier at building exterior wall in siding					
Vapor barrier under slab					
Foundation insulation					
Insulated exterior metal wall panel 6,930 sf @ \$45					
Expansion joints					
Fire proofing					
Membrane roof with insulation 8,378sf @ \$18					
Fire sealing					
Joint sealants					
DIV 8 DOORS & WINDOWS					
Doors, frames and hardware 113 leafs @ \$1,300 ea					
Aluminum entrances AUTOMATIC 12 leafs @ \$3000 ea					
Aluminum windows exterior 870 sf @ \$55					
Aluminum windows exterior 1 hr 720 sf @ \$225					
Aluminum windowstore front exterior 720 sf @ \$75					
Glass and glazing					
DIV 9 FINISHES					
Drywall and metal studs					
Acoustical ceilings standard 20,837sf @ \$6.00/sf					
Acoustical ceilings stone 7,038 sf @ \$8.50/sf					
Flooring, area of value over all floors					
Moisture mitigation barrier one					
Wall Coverings					
Paint interior					
Paint exterior					
DIV 10 SPECIALTIES					
Wall and corner protection					
Misc specialties					

NO OWNER COST IN THIS BUDGET

Based on LBA Modernization Project CON Submission January 2016

Assume 14 months for Addition
Assume 6 months for renovations

Revision 0
4/8/2016
REVISED

New Construction		Renovations	
Ground Floor addition	8520 sf	Tie in at ground level	400 sf
First Floor addition	7219 sf	PACU Renovations	2150 sf
Second Floor addition	6192 sf	ENDO Renovations	1836 sf
Third Floor addition	6152 sf	Storage/Anesthesia	1878 sf
Total Gross New Area	27876 sf	Corridor, media, HPC, Toller	822 sf
		Total Gross Renovated Area	7123 sf

DIV	DESCRIPTION	NEW CONSTRUCTION			RENOVATIONS			TOTAL PROJECT		
		SF Cost	Total Section Cost	Total Division Cost	SF Cost	Total Section Cost	Total Division Cost	Total Section Cost	Total Division Cost	% of Total Cost
DIV 11	EQUIPMENT	None	\$13,938	\$97,863	None	\$0.75	\$5,242	\$19,280	\$152,766	\$4.36
DIV 12	FURNISHINGS	None	None	None	None	None	None			
DIV 13	SPECIAL CONSTRUCTION	None	None	None	None	None	None			
DIV 14	CONVEYING SYSTEMS	None	None	None	None	None	None			
	4 Stop elevator @ \$34,844/stop	\$5.00	\$139,375			\$0.00	\$0	\$139,375		
	4 Stop elevator @ \$34,844/stop	\$5.00	\$139,375			\$0.00	\$0	\$139,375		
	2 Stop elevator @ \$38,328/stop	\$2.75	\$76,656			\$0.00	\$0	\$76,656		
	2 Stop elevator @ \$38,328/stop	\$2.75	\$76,656	\$432,063		\$0.00	\$0	\$76,656	\$432,063	\$12.35
DIV 21	Fire Suppression									
	New sprinkler	\$4.50	\$125,438			\$5.00	\$35,615	\$161,053		
	New Stand pipes	\$1.00	\$7,875			\$0.00	\$0	\$7,875		
	New main for addition 150"	\$0.50	\$15,938			\$0.00	\$0	\$15,938		
	Rework Sprinkler line to Richards	\$0.50	\$15,938			\$0.00	\$0	\$15,938		
	Temp sprinkler coverage	\$0.00	\$0	\$181,186		\$0.50	\$3,562	\$3,562	\$220,364	\$6.30
DIV 22	Plumbing									
	Plumbing OR CSP \$24,765/sf	\$13.82	\$985,233			\$12.00	\$85,476	\$470,709		
	Plumbing level 3 and 4 \$14,006/sf	\$6.18	\$172,268			\$0.00	\$0	\$172,268		
	Med gas no booms or columns	\$12.00	\$334,500			\$10.00	\$71,230	\$405,730		
	Equipment air system	\$0.00	\$0			\$0.00	\$0	\$0		
	Anesthetic gas disposal system	\$0.00	\$0			\$0.00	\$0	\$0		
	In above	\$0.00	\$0			\$0.00	\$0	\$0		
	Nitrogen and nitrous oxide system	\$0.00	\$0			\$0.00	\$0	\$0		
	In above	\$0.00	\$0			\$0.00	\$0	\$0		
	Carbon dioxide system	\$0.60	\$16,725			\$0.00	\$0	\$16,725		
	Med gas testing	\$0.60	\$16,725			\$0.00	\$0	\$16,725		
	Reverse Osmosis	\$2.25	\$62,719	\$34,855		\$0.00	\$0	\$62,719	\$1,128,150	\$32.23
DIV 23	HVAC									
	HVAC OR CSP \$21,064/sf	\$39.69	\$1,106,399			\$55.00	\$391,765	\$1,498,124		
	HVAC level 3 and 4 \$46,004/sf	\$20.30	\$565,863			\$0.00	\$0	\$565,863		
	New boilers 3ea 200 BHP Tube fired @ \$400,000 ea	\$45.00	\$1,185,625			\$0.00	\$0	\$1,185,625		
	Temporary boiler	\$0.00	\$0			\$0.00	\$0	\$0		
	Adit 500 gal surge tank to existing boiler feed	\$0.35	\$9,756			\$0.00	\$0	\$9,756		
	New 270 ton chiller	\$10.00	\$278,750			\$0.00	\$0	\$278,750		
	Clean existing fuel oil tanks	\$1.75	\$46,791			\$0.00	\$0	\$46,791		
	New steam line to Richards	\$1.40	\$39,025			\$0.00	\$0	\$39,025		
	Test and balance	\$12.00	\$334,500	\$3,665,294		\$12.00	\$85,476	\$419,976	\$4,153,922	27.57%
DIV 26	ELECTRICAL									
	Electrical distribution OR CSP \$284/sf	\$15.64	\$435,965			\$12.00	\$95,476	\$531,441		
	Electrical distribution level 3 and 4 \$146/sf	\$6.18	\$172,268			\$0.00	\$0	\$172,268		
	Lighting	\$10.00	\$278,750			\$14.00	\$99,722	\$378,472		
	Rework existing electrical distribution	\$3.50	\$97,583			\$0.00	\$0	\$97,583		
	Fire alarm	\$2.00	\$55,750			\$2.00	\$14,246	\$69,996		
	Nurse call	\$3.00	\$88,625			\$3.00	\$21,369	\$104,994		
	Master Clock system	\$0.25	\$6,969			\$1.00	\$7,123	\$14,092		
	Paging systems	\$0.25	\$6,969			\$0.50	\$3,562	\$10,530		
	Lighting protection	\$0.65	\$18,119			\$0.00	\$0	\$18,119		
	Telephone and data	\$1.00	\$27,875	\$1,183,951		\$2.00	\$14,246	\$42,121	\$1,429,595	\$40.85
DIV 31	Sitework									
	Site demo dead/grub	\$3.00	\$83,625			\$0.00	\$0	\$83,625		
	Sitework associated with building	\$12.00	\$334,500			\$0.00	\$0	\$334,500		
	Additional storm water treatment due to new building	\$3.00	\$83,625			\$0.00	\$0	\$83,625		
	Landscaping	\$0.75	\$20,906			\$0.00	\$0	\$20,906		
	Sitework to rework sidewalk area	\$1.00	\$27,875	\$550,531		\$0.00	\$0	\$27,875	\$550,531	\$16
SUB TOTALS		\$435.21	\$12,151,478	\$12,151,478	\$287.25	\$1,832,392	\$1,832,392	\$13,983,871	\$13,983,871	92.69%
DIV 17	CONSTRUCTION MANAGER									
	CM Estimating Contingency	5.00%	\$21,765	\$606,574		\$12.86	\$91,620	\$698,194		
	CM Fee	2.75%	\$12,577	\$350,296		\$7.43	\$52,910	\$403,206	\$1,101,400	\$31
TOTALS		\$468.54	\$13,086,348	\$13,086,348	\$277.54	\$1,976,922	\$1,976,922	\$15,065,271	\$15,065,271	100.00%

NO OWNER COST IN THIS BUDGET

Revision 0
4/9/2016

REVISED

Based on LBA Modernization Project CON Submission January 2016

Assume 14 months for Addition
Assume 6 months for renovations

New Construction		Renovations	
Ground Floor addition	9352 sf	Tie in at ground level	400 sf
First Floor addition	7219 sf	PACU Renovations	2180 sf
Second Floor addition	6152 sf	ENDO Renovations	1835 sf
Third Floor addition	6152 sf	Storage/Anesthesia	1878 sf
Total Gross New Area	27876 sf	Corridor, med, I/HK, Toilet	827 sf
		Total Gross Renovated Area	7123 sf

NEW CONSTRUCTION			
SF Cost	Total Section Cost	Total Division Cost	Total Division SF Cost

RENOVATIONS			
SF Cost	Total Section Cost	Total Division Cost	Total Division SF Cost

TOTAL PROJECT			
Total Section Cost	Total Division Cost	Total Division SF	% of Total Cost

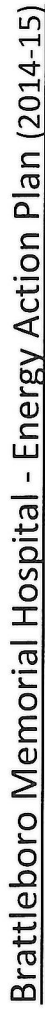
Division Cost of Mechanical Upgrade Work			
New boilers 3ea 200 BHP Tube fired @ \$400,000 ea	\$1,198,625		
Temporary boiler	\$55,750		
Clean existing fuel oil tanks	\$27,875		
Add 300 gal surge tank to existing boiler feed	\$9,756		
New 270 ton chiller	\$278,750	\$1,570,756	\$56.35

BRATTLEBORO MEMORIAL HOSPITAL
RONALD READ PAVILION
MODERNIZATION PROJECT

Docket No. GMCB-001-16con

APPENDIX D

- BMH Energy Action Plan (2014-2015)



Efficiency Vermont

Goals: Reduce energy costs by 3%:	\$	78,963	Reduce energy use per sq-ft by 3%:	244	kBtu
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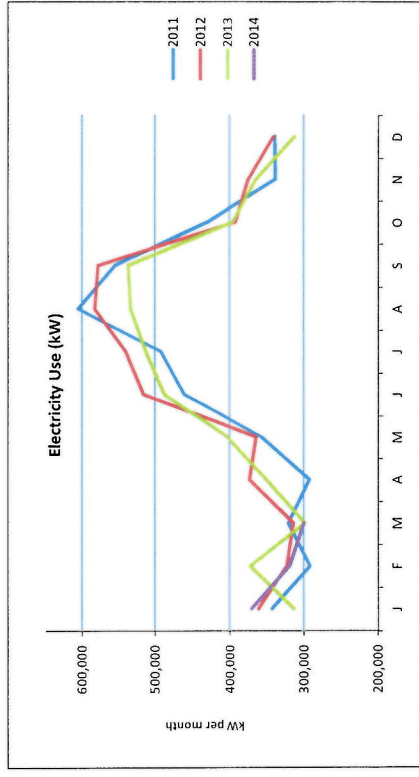
David Adams - Staff Manager, Account Management

Action Plan			Completed Efforts / 2012- Present							
	Project Costs	Annual Savings	Project Description	Date	Proj. Costs	Incentives	Annual Savings	kWh Reduce	Oil (gallons)	
1. Upgrade of chilled water plant systems Oct14 Upgrade chiller to VSD Oct14 Add DP to VFD serving CW pumps Oct14 CW temperature reset	\$ 270,000	\$ 15,250	Lighting - LED wall packs & canopy	Jun12	\$ 2,884	\$ 1,320	\$ 709	8,909		
	\$ 12,000	\$ 5,500	Lab exhaust study	Aug12	\$ 4,200	\$ 3,150	\$ -	\$ -	\$ -	
	\$ 4,000	\$ 4,600	HVAC	Sep12	\$ 5,000	\$ 2,500	\$ 1,521	11,561		
			Lighting - HBOT area	Apr13	\$ 2,480	\$ 500	\$ 690	2,552	131	
			Energy audit - JFPCS	Nov14	\$ 9,800	\$ 4,900	\$ -	\$ -	\$ -	
2. Optimization of building HVAC systems Nov13 Energy audit conducted by JFPCS (cost share with EVT) Nov14 VAV SP Setpoint Reset - Richards Nov14 AC-1 serving the OR Suite - add unoccupied cycle Nov14 AC-1 serving the OR Suite - add economizer cycle Nov15 Add VFDs to heating pumps	\$ 9,800	\$ -	Exterior LED - pole mounted	Jan14	\$ 4,750	\$ 3,250	\$ 1,635	11,864		
	\$ 4,000	\$ 3,143	Various measures from JFPCS audit	May14	\$ 34,100	\$ 7,900	\$ 3,705	41,168	214	
	\$ 6,700	\$ 16,099								
	\$ 14,900	\$ 5,994								
	\$ 9,700	\$ 2,150								
3. Pursue targeted upgrades of lighting to LEDs Jul14 Replace helipad lighting with LED bollards Jul14 Replacing parking lot lighting with LEDs Oct14 Conduct lighting audit of targeted spaces for potential upgrades/controls	\$ -	\$ -								
			Totals:	\$ 63,214	\$ 23,520	\$ 8,260	76,054	345		
Results & Energy Star Impacts										
4. Hospital renovation projects Jul14 ER, MRI, and entranceway Oct16 OR suite expansion Oct17 Boiler room renovation	\$ -	\$ 5,000								
5. Employee engagement through energy workshops & campaigns Jan15 Host a Kaizen event to focus on energy waste in targeted hospital areas Apr15 Launch Employee Energy Challenge										
6. Build efficiency into operations & maintenance practices and new designs Aug14 Upgrade circulator pumps to Grundfos technology Sep14 Kitchen - equipment and operational changes Oct14 Verify operational control strategies & scheduling for HVAC systems Nov14 Institute use of SkySpark as a facilities management tool	\$ 331,100	\$ 57,736								

Square footage: 165000

Utility Usage Data			Btu per Square-foot Calcs			
Month	Electricity (kW)	Oil (gal)	kBtu			
	Hospital		Electricity	Oil	Total	kBtu/sq-ft
Last 12mo	4,883,314	176,950	16661867.37	603753.4	17265620.77	
Feb14	299,941	20,690	1023398.692	2855220	3878618.692	249
Jan14	319,143	27,548	1088915.916	3801624	4890539.916	249
Dec13	369,708	13,787	1261443.696	1902606	3164049.696	248
Nov13	312,380	13,727	1065840.56	1894326	2960166.56	246
Oct13	364,280	13,743	1242923.36	1896534	3139457.36	252
Sep13	395,466	6,845	1349329.992	944610	2293939.992	251
Aug13	536,207	13,710	1829538.284	1891980	3721518.284	251
Jul13	533,008	6,465	1818623.296	892170	2710793.296	251
Jun13	512,121	13,717	1747356.852	1892946	3640302.852	252
May13	487,575	6,872	1663605.9	948336	2611941.9	252
Apr13	403,104	26,538	1375390.848	3662244	5037634.848	257
Mar13	350,381	13,308	1195499.972	1836504	3032003.972	245
Feb13	299,029	20,201	1020286.948	2787738	3808024.948	245
Jan13	372,142	26,117	1269748.504	3604146	4873894.504	244
Dec12	313,484	12,834	1069607.408	1771092	2840699.408	243
Nov12	341,185	19,332	1164123.22	2667816	3831939.22	249
Oct12	374,889	12,767	1279121.268	1761846	3040967.268	249
Sep12	391,842	6,364	1336964.904	878232	2215196.904	243
Aug12	578,079	12,755	1972405.548	1760190	3732595.548	249
Jul12	582,322	6,433	1986882.664	887754	2874636.664	249
Jun12	539,642	12,779	1841258.504	1763502	3604760.504	249
May12	515,073	12,820	1757429.076	1769160	3526589.076	248
Apr12	364,115	12,829	1242360.38	1770402	3012762.38	247
Mar12	372,698	12,843	1271645.576	1772334	3043979.576	247
Feb12	314,049	19,281	1071535.188	2660778	3732313.188	251
Jan12	322,869	25,631	1101629.028	3537078	4638707.028	256
Dec11	360,860	19,265	1231254.32	2658570	3889824.32	250
Nov11	339,146	19,257	1157166.152	2657466	3814632.152	
Oct11	338,106	6,392	1153617.672	882096	2035713.672	
Sep11	429,088	12,754	1464048.256	1760052	3224100.256	
Aug11	554,063	12,860	1890462.956	1774680	3665142.956	
Jul11	605,244	6,387	2065092.528	881406	2946498.528	
Jun11	492,056	12,787	1678895.072	1764606	3443501.072	
May11	460,944	12,934	1572740.928	1784892	3357632.928	
Apr11	357,073	12,665	1218333.076	1747770	2966103.076	
Mar11	292,683	19,407	998634.396	2678166	3676800.396	
Feb11	320,957	25,750	1095105.284	3553500	4648605.284	
Jan11	291,952	19,307	996140.224	2664366	3660506.224	
Dec10	342,796	0	1169619.952	0	1169619.952	

READDATE	YEAR	YEAR2	MONTH	MONTH-MAx(DAYS)	KWHTOT	KWHPEAK	KWHOFF	KWPEAK	KWOFF	Actual kWh// Cost (@0.111/kWh)	Rolling 12-month	
1/14/2011	2011	2011	J	1	32	342796	185900	156896	568	456	10,712 \$	38,050
2/11/2011	2011	2011	F	2	28	291952	152648	139304	559	444	10,427 \$	32,407
3/14/2011	2011	2011	M	3	31	320957	162167	158790	669	435	10,353 \$	35,626
4/11/2011	2011	2011	A	4	28	292683	152344	140339	753	620	10,453 \$	32,488
5/10/2011	2011	2011	M	5	29	357073	193866	163207	919	716	12,313 \$	39,635
6/9/2011	2011	2011	J	6	30	460944	251112	209832	1164	902	15,365 \$	51,165
7/9/2011	2011	2011	J	7	30	492056	268447	223609	1082	834	16,402 \$	54,618
8/10/2011	2011	2011	A	8	32	605244	306557	298687	1220	1076	18,914 \$	67,182
9/12/2011	2011	2011	S	9	33	554063	281726	272337	1072	945	16,790 \$	61,501
10/11/2011	2011	2011	O	10	29	429088	233919	195169	1035	883	14,796 \$	47,629
11/9/2011	2011	2011	N	11	29	338106	183219	154887	797	580	11,659 \$	37,530
12/9/2011	2011	2011	D	12	30	339146	183251	155895	748	594	11,305 \$	37,645
1/10/2012	2012	2012	J	1	32	360860	179208	181652	603	493	11,277 \$	40,055
2/9/2012	2012	2012	F	2	30	322869	173114	149755	706	458	10,762 \$	35,838
3/9/2012	2012	2012	M	3	29	314049	166660	147389	785	564	10,829 \$	34,859
4/10/2012	2012	2012	A	4	32	372698	193270	179428	885	704	11,647 \$	41,369
5/9/2012	2012	2012	M	5	29	364115	194994	169121	971	721	12,556 \$	40,417
6/11/2012	2012	2012	J	6	33	515073	263372	251701	1131	897	15,608 \$	57,173
7/11/2012	2012	2012	J	7	30	539642	290575	249067	1193	917	17,988 \$	59,900
8/10/2012	2012	2012	A	8	30	582322	310840	271482	1143	1025	19,411 \$	64,638
9/12/2012	2012	2012	S	9	33	578079	293300	284779	1040	936	17,518 \$	64,167
10/10/2012	2012	2012	O	10	28	391842	209528	182314	911	755	13,994 \$	43,494
11/9/2012	2012	2012	N	11	30	374889	201481	173408	829	712	12,496 \$	41,613
12/11/2012	2012	2012	D	12	32	341185	172219	168966	779	676	10,662 \$	37,872
1/10/2013	2013	2013	J	1	30	313484	166857	146627	599	494	10,449 \$	34,797
2/11/2013	2013	2013	F	2	32	372142	186757	185385	781	506	11,629 \$	41,308
3/10/2013	2013	2013	M	3	27	299029	159786	139243	660	613	11,075 \$	33,192
4/9/2013	2013	2013	A	4	30	350381	179170	171211	785	627	11,679 \$	38,892
5/9/2013	2013	2013	M	5	30	403104	223320	179784	869	711	13,437 \$	44,745
6/11/2013	2013	2013	J	6	33	482525	253146	234429	1058	952	14,775 \$	54,121
7/10/2013	2013	2013	J	7	29	512121	270777	241844	1093	969	17,659 \$	56,845
8/9/2013	2013	2013	A	8	30	533008	291908	241100	1093	931	17,767 \$	59,164
9/11/2013	2013	2013	S	9	33	536207	279470	256737	1085	919	16,249 \$	59,519
10/10/2013	2013	2013	O	10	29	395466	215541	179925	1072	756	13,637 \$	43,897
11/11/2013	2013	2013	N	11	32	364280	189343	174937	791	622	11,384 \$	40,435
12/10/2013	2013	2013	D	12	29	312380	164554	147826	698	591	10,772 \$	34,674
1/13/2014	2014	2014	J	1	34	369708	189567	180141	612	551	10,874 \$	41,038
2/11/2014	2014	2014	F	2	29	319143	169914	149229	679	502	11,005 \$	35,425
3/11/2014	2014	2014	M	3	28	299941	156315	143626	599	547	10,712 \$	33,293



Month	2014	2013	2012	2011	Diff 2011-12	Diff 2011-13	Diff 2011-2014	Oil Usage (Rolling 12-month)
J	27548	26,117	25,631	19,307	(6,324)	(6,810)	(8,241)	Dec-10 19,307
F	20690	20,201	19,281	25,750	6,469	5,549	5,060	Jan-11 25,750
M	13858	13,308	12,843	19,407	6,564	6,099	5,549	Feb-11 45,057
A	19716	26,538	12,829	12,665	(164)	(13,873)	(7,051)	Mar-11 19,407
M	6419	6,872	12,820	12,934	114	6,062	6,515	Apr-11 12,665
J	12841	13,717	12,779	12,787	8	(930)	(54)	May-11 12,934
J		6,465	6,433	6,387	(46)	(78)		Jun-11 12,787
A		13,710	12,755	12,860	105	(850)		Jul-11 6,387
S		6,845	6,364	12,754	6,390	5,909		Aug-11 12,860
O		13,743	12,767	6,392	(6,375)	(7,351)		Sep-11 12,754
N		13,727	19,332	19,257	(75)	5,530		Oct-11 6,392
D		13,787	12,834	19,265	6,431	5,478		Nov-11 19,257
Totals:	101,072	175,030	166,668	179,765	13,097	4,735	1,778	Dec-11 19,265
					\$ 39,945.85	\$ 14,441.75	\$ 5,422.90	Jan-12 25,631
					Cost Savings: -5%			Feb-12 19,281
								Mar-12 12,843
								Apr-12 12,829
								May-12 12,820
								Jun-12 12,779
								Jul-12 6,433
								Aug-12 12,755
								Sep-12 6,364
								Oct-12 12,767
								Nov-12 19,332
								Dec-12 12,834
								Jan-13 26,117
								Feb-13 20,201
								Mar-13 13,308
								Apr-13 26,538
								May-13 6,872
								Jun-13 13,717
								Jul-13 6,465
								Aug-13 13,710
								Sep-13 6,845
								Oct-13 13,743
								Nov-13 13,727
								Dec-13 13,787
								Jan-14 27,548
								Feb-14 20,690
								Mar-14 13,858
								Apr-14 19,716
								May-14 6,419
								Jun-14 12,841
								169,349

