

Vermont Veterans Home (VVH) Bennington, VT

COMPREHENSIVE PLAN TO ADDRESS ONGOING MOLD ISSUES

Executive Summary:

Mold is a general term used to describe microbial elements which are ever existent in nature. They exist in our environment and are circulated through different transport sources such as ambient air, liquid and various everyday objects. Mold cannot be eliminated in commercial buildings like Vermont's Veteran Home (VVH); therefore, the primary and most important methods to controlling its growth are to solve all moisture intrusion sources within the effected spaces.

In the basement levels these sources are due to building envelope conditions and mechanical seals within the building envelope. After these contributive source conditions are solved within the environment the mechanical systems and materials can then be remediated and monitored regularly against future moisture issues.

As with the basement levels VVH has also experienced issues with mechanical equipment in the past. These issues within the equipment have all been remediated however to prevent future issues the existing equipment not yet effected should also be proactively remediated. This includes the removal of potential sources of moisture that may be conducive to mold growth within the mechanical units and limiting the quantity of units to reduce the locations moisture or liquid may develop.

This document provides recommendations on preventing and minimizing mold growth at VVH. Below are the recommendations as they pertain to the various sections of VVH.

Currently Known Mold Issues:

All basement levels were found to have varying degrees of mold growth due to excessive moisture. A microbial work plan was developed identifying these spaces and put out to bid to qualified mold remediation contractors (MRCs). These areas and others identified to have elevated mold concentrations were remediated during the summer of 2013. The microbial work plan measures were verified by Crothers Environmental Group, LLC (CEG) whom conducted post-remediation inspections and air monitoring.

Limited mold issues were identified above the basement levels within the console Water Source Heat Pumps (WSHPs) and these units were remediated in the summer of 2012. Ultra-violet (UV) lights were recommended and installed in those console WSHPs previously effected by mold. The UV lights mitigate and prevent future mold growth by sterilizing airborne bacteria in the WSHPs, including mold. All other mechanical equipment at this site was found to be free from mold.

The “Phase II microbial work plan” also included future remediation efforts for various building spaces and the second floor Administration Building. These space remediation recommendations and cost estimates are described below.

[Crothers Environmental Group, LLC (2014). Vermont Veterans Home (VVH) – Bennington, Vermont Comprehensive Plan to Address Ongoing Mold Issues]

General Space Remediation Requirements:

All spaces and systems effected by mold should be evaluated and documented by an Environmental Consultant (EC) to define the scope of mold effected spaces and materials. This evaluation and documentation can then be utilized by a qualified MRC who would perform the scope of work related to the removal, discarding and cleaning of all spaces and materials that require mold remediation. These mold remediation recommendations and cost estimates listed below shall serve as an addendum to the scope of work identified by the EC and by the Construction Bid Documents dated December 12, 2013. All new mechanical system materials to be furnished and installed shall be approved by the Vermont Energy Standards, ASHRAE 62.1-2007 and Underwriters Laboratories (UL) standard UL181.

“A” Wing Basement Mechanical Room:

In this mechanical room, prolonged exposure to moisture effected existing absorbent and porous mechanical system materials to mold. These materials included ductwork and piping insulation and all mechanical system filters. It is recommended that the effected materials be removed and discarded of and then the areas of removal be sanitized properly before any new work is performed.

The estimated remediation cost, for furnishing and installing new mechanical insulation and filters, would be approximately \$12,000.00 (refer to task 2 of the Vermont Veteran’s Home Mold Remediation MEP Costs).

North Wing Crawl Spaces:

Until recently, these crawl spaces contained exposed soil ground levels which allowed moisture to easily invade these spaces. Currently, these spaces has been replaced with concrete flooring which has greatly reduced the moisture levels, however, the sustained exposure to moisture effected existing absorbent and porous mechanical piping insulation materials to mold. It is recommended that the effected materials be removed and discarded of and then the areas of removal be sanitized properly before any new work is performed.

The estimated remediation cost, for furnishing and installing new mechanical insulation and filters, would be approximately \$30,000.00 (refer to task 2 of the Vermont Veteran's Home Mold Remediation MEP Costs).

East Wing Basement Crawl Space:

This crawl space contains exposed soil as the ground level which has allowed moisture to easily penetrate through and into the space. The extended periods of moisture exposure has precipitated mold growth and the existing absorbent and porous mechanical system materials were effected. These materials included ductwork and piping insulation. It is recommended that the effected materials be removed and discarded of and then the areas of removal be sanitized properly before any new work is performed.

The estimated remediation cost, for furnishing and installing new mechanical insulation and filters, would be approximately \$38,000.00 (refer to task 2 of the Vermont Veteran's Home Mold Remediation MEP Costs).

Administration Building:

This basement did not contain exposed soil levels or lengthened periods of moisture exposure. The basement is adjacent to areas effected by mold which do require remediation. Therefore, it is recommended that materials which appear to be effected by moisture or are visibly stained be remediated to avoid any probable instances of mold growth. These materials include ductwork and piping insulation. It is recommended that the moisture latent and visibly stained materials be removed and discarded of and then the areas of removal sanitized before any new work is performed. These precautionary measures will aid in reducing mold growth.

The estimated remediation cost, for furnishing and installing new mechanical insulation and filters, would be approximately \$19,000.00 (refer to task 2 of the Vermont Veteran's Home Mold Remediation MEP Costs).

In the second floor of the existing building it is recommended that the existing finned tube radiation heating system and the retrofitted two-pipe chilled water fan coil units (FCUs) be removed. These systems have also been effected by mold. The existing console WSHPs removed from the Main Level areas shall be reinstalled on the second floor and the existing geothermal piping system extended to serve them. This will provide heating and cooling to these spaces. The existing rooftop unit (RTU) shall be removed and replaced with a new RTU to provide the required ventilation. This unit shall also be served off of the existing geothermal system. There is little if any additional load on the existing geothermal system with regard to the above listed improvements as the load is being carried by the existing console units.

The estimated remediation cost, for furnishing and installing new mechanical insulation and filters, would be approximately \$323,400.00 (refer to tasks 4 and 5 of the Vermont Veteran's Home Mold Remediation MEP Costs).

Chapel Basement Crawl Space:

The exposed soil in this crawl space has allowed moisture to easily infiltrate through the ground level and into the space. The extended periods of moisture exposure has allowed mold growth and the existing absorbent and porous mechanical system materials were effected. These materials included ductwork and piping insulation. It is recommended that the effected materials be removed and discarded of and then the areas of removal be sanitized properly before any new work is performed. The existing hangers and supports should be removed, sanitized and reinstalled.

The estimated remediation cost, for furnishing and installing new mechanical insulation and filters, would be approximately \$27,000.00 (refer to task 2 of the Vermont Veteran's Home Mold Remediation MEP Costs).

"D" Wing Basement:

This basement was not subjected to extended moisture levels and the effected areas appear to be limited. It is recommended that materials which are suspected to be effected by moisture or are visibly stained be remediated to avoid any probable instances of mold growth. These materials include ductwork and piping insulation. It is recommended that the moisture latent and visibly stained materials be removed and discarded of and then the areas of removal sanitized before any new work is performed. These precautionary measures will aid in reducing mold growth.

The estimated remediation cost, for furnishing and installing new mechanical insulation and filters, would be approximately \$20,000.00 (refer to task 2 of the Vermont Veteran's Home Mold Remediation MEP Costs).

Food Service Basement:

This area had been part of limited mold remediation procedures in the past (2013). The areas appear to be within acceptable moisture levels and no remediation is recommended at this time. If periodic surveillance of the space displays evidence of reoccurring mold issues then a more comprehensive measure should be taken to combat it.

This more comprehensive measure would include replacing all mechanical insulation and filters and would be approximately \$23,000.00 (refer to task 2 of the Vermont Veteran's Home Mold Remediation MEP Costs).

Tunnel to Boiler Room:

This area has been burdened with prolonged exposures to moisture resulting in mold growth. It is recommended that all of the existing mechanical system materials be removed and replaced with new. These materials include ductwork and piping insulation. It is recommended that the effected materials be removed and discarded of and then the areas of removal be sanitized properly before any new work is performed.

This more comprehensive measure would include replacing all mechanical insulation and filters and would be approximately \$26,400.00 (refer to task 2 of the Vermont Veteran's Home Mold Remediation MEP Costs).

"B" and "C" Wing Basements:

These areas have had prolonged exposure to moisture and mold growth which have effected the existing absorbent and porous mechanical system materials. These materials included ductwork and piping insulation and all mechanical system filters. It is recommended that the effected materials be removed and discarded of and then the areas of removal be sanitized properly before any new work is performed.

The estimated remediation cost, for furnishing and installing new mechanical insulation and filters, would be approximately \$120,000.00 (refer to task 2 of the Vermont Veteran's Home Mold Remediation MEP Costs).

Main Level Areas:

Various main level areas were addressed in addition to the problematic console WSHPs remediated in the summer of 2012. Conservatively, it was recommended and agreed that the console WSHPs be replaced with horizontal type WSHPs and central Air Handling Units (AHUs) located in the basement levels to eliminate the sources of moisture necessary for mold growth in the occupied areas. These areas in the basement also coincide with the mold remediation efforts mentioned above. It ensures that the new location of WSHPs and AHUs in the basement will not be exposed to mold. Locating these units in the basement also decreases the amount of condensate distribution and water transportation to their final source. The existing WSHPs to be removed shall be disconnected and turned-over to VVH for future use and existing unit replacements. New horizontal WSHPs shall be hung from the existing basement slab structure and shall serve Dining Room-W 513; Art Room 412 and Activities 612. A single vertical style WSHP installed in a Main

Level storage room shall serve Office 314 and (4) four floor mounted AHUs shall serve TV Room 315; Office 321; Namaste 322; Office 323; Dirk's Room 320; TV Room 514; Waiting 510; Staff Kitchen 516 and Café 515. All new equipment mentioned shall be served by a new Water to Water Heat Pump system (WWHP) to produce both chilled and hot water distribution to the AHUs and reheat coils. The existing geothermal heat pump system shall remain and distribution piping shall be modified to serve the new horizontal and vertical heat pumps with minimal load effects as piping is being reused to serve the new units.

The estimated remediation cost, for furnishing and installing new mechanical equipment, piping and sheet metal, would be approximately \$476,400.00 (refer to tasks 1 and 3 of the Vermont Veteran's Home Mold Remediation MEP Costs).

Total Estimated Cost for Comprehensive Remediation Activities:

The estimated remediation cost for all of the recommendations above is approximately \$1,226,720.00 (refer to of the Vermont Veteran's Home Mold Remediation MEP Costs). This figure is an estimated construction cost and does not include project design or construction administrative tasks.

Post Remediation Preventative Measures:

As with all newly installed systems, preventative measures should be implemented to prevent future mold issues. It is recommended that regularly scheduled assessments of the materials in the basement be monitored for dampness, moisture or signs of mold growth. If any signs of these factors arise again it is recommended that immediate action be taken to remove, discard and sanitize them be conducted to mitigate the situation quickly. All new mechanical equipment shall also be periodically inspected for excessive moisture or leaks and those existing units as well. As effective as the existing UV lights are it is recommended that the bulbs be replaced yearly, or per the manufacturer's recommendations, to ensure their effectiveness in combating microbial organisms from developing to harmful levels. These remedial and proactive measures should prevent future reactive measures on a larger scale and are essential for maintaining safe environments for occupants of the facility.

References:

- (CEG) [Crothers Environmental Group, LLC (2014). Vermont Veterans Home (VVH) – Bennington, Vermont Comprehensive Plan to Address Ongoing Mold Issues]
- (U.L. Standard 181) [Underwriters Laboratories Standard 181 Factory-Made Air Ducts and Air Connectors, Closure Systems for use with Rigid Air Ducts UL181A, Closure Systems for Use with Flexible Air Ducts and Air Connectors UL181B]
- (Vermont Energy Standards) [State of Vermont. (2011). Vermont Commercial Building Energy Standards]
- (ASHRAE 62.1-2007) [American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc. (2007). ANSI/ASHRAE Standard 62.1-2007 Ventilation for Acceptable Indoor Air Quality]
- RSMeans Mechanical Cost Data (37th Annual Edition, pp. 1-800). (2014). Norwell, MA: Reed Construction Data, LLC.

Cost Estimate Sheet

PROJECT NAME:
Vermont Veteran's Home Mold Remediation MEP Costs
PROJECT NUMBER:
7664

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Description	Quantity	Unit	Unit Material	Unit Labor	Total Unit Cost	Total Cost
Task 1 Basement/Main Level Heat Pumps						
Water to Air Heat Pumps	4	ea	3000	1000	\$ 4,000.00	\$ 16,000
Ductwork	4	room	3000	2000	\$ 5,000.00	\$ 20,000
Additional Piping (HPS HPR CD w/Pump)	4	hp	2000	1500	\$ 3,500.00	\$ 14,000
Registers and Grills	4	room	1000	400	\$ 1,400.00	\$ 5,600
Additional OA Coils and Piping	4	ea	1200	2000	\$ 3,200.00	\$ 12,800
Insulation	1	ls				\$ 10,000
Cutting/Patching	1	ls				\$ 8,000
Electrical	4	ea	400	600	\$ 1,000.00	\$ 4,000
Controls	20	points			\$ 700.00	\$ 14,000
Testing and Balancing	1	ls				\$ 3,500
Demolition/Storage of Old Console Units	1	ls				\$ 5,000
Task 1 Total						\$ 112,900
Task 2 Piping & Insulation Remediation						
A-Wing Basement	1	room	6000	6000	\$ 12,000.00	\$ 12,000
North Wing Crawl Spaces	1	room	15000	15000	\$ 30,000.00	\$ 30,000
East Wing Basement	1	room	19000	19000	\$ 38,000.00	\$ 38,000
Administration Building Mechanical Area Bsmt	1	room	9500	9500	\$ 19,000.00	\$ 19,000
Chapel Basement Crawl Spaces	1	room	13500	13500	\$ 27,000.00	\$ 27,000
D-Wing Basement	1	room	10000	10000	\$ 20,000.00	\$ 20,000
Food Service Basement	1	room	11500	11500	\$ 23,000.00	\$ 23,000
Tunnel to Boiler Room	1	room	13200	13200	\$ 26,400.00	\$ 26,400
B & C-Wing Basements	1	room	60000	60000	\$ 120,000.00	\$ 120,000
Task 2 Total						\$ 315,400
Task 3 Basement Air Handling Unit						
AHU	4	ea	12000	3000	\$ 15,000.00	\$ 60,000
Ductwork	4	ls	10000	15000	\$ 25,000.00	\$ 100,000
Additional Water to Water Heat Pumps	5	ls	5000	2000	\$ 7,000.00	\$ 35,000
Additional Piping (HPS HPR CD w/Pump)	4	ls	4800	4700	\$ 9,500.00	\$ 38,000
Additional Pumps and Misc Specialties	1	ls				\$ 8,000
Registers and Grills	20	ea	50	100	\$ 150.00	\$ 3,000
Insulation	4	ls				\$ 8,000
Cutting/Patching	4	ls				\$ 7,000
Electrical	4	ls				\$ 7,000
Fire Alarm	4	ls				\$ 5,000
Controls	120	points			\$ 700.00	\$ 84,000
Testing and Balancing	1	ls				\$ 5,000
Demolition/Storage of Old Console Units	1	ls				\$ 3,500
Task 3 Total						\$ 363,500
Task 4 Rooftop Air Handling Unit						
RTU With Curb	1	ea	13000	5000	\$ 18,000.00	\$ 18,000
Ductwork	1	ls	10000	11000	\$ 21,000.00	\$ 21,000
Additional Piping (HPS HPR CD w/Pump)	1	ls	6000	5400	\$ 10,400.00	\$ 10,400
Additional Pumps and Misc Specialties	0	ls				\$ 8,000
Cutting/Patching	1	ls				\$ 5,000
Roof Duct Supports	1	ls				\$ 2,500
Insulation	1	ls				\$ 10,000
Electrical	1	ls				\$ 5,800
Fire Alarm	1	ls				\$ 5,000
Controls	30	points			\$ 700.00	\$ 21,000
Testing and Balancing	1	ls				\$ 3,000
Demolition/Storage of Old Console Units	1	ls				\$ 3,500
Task 4 Total						\$ 113,200
		Unit	Unit	Total	Total	

Cost Estimate Sheet

PROJECT NAME:
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Description	Quantity	Unit	Material	Labor	Unit Cost	Cost
Task 6 1st & 2nd Floors Administration						
Demo Exist Fin Tube and Fan Coil Systems	1	ls				\$ 7,000
Relocate and Reinstall Consoles	19	ea	1000	2000	\$ 3,000.00	\$ 67,000
Extension of Geo HP Loop	1	ls				\$ 50,000
Cutting/Patching	1	ls				\$ 5,000
Insulation	1	ls				\$ 16,000
Electrical	19	ea	400	600	\$ 1,000.00	\$ 19,000
Controls	76	points			\$ 700.00	\$ 53,200
Testing and Balancing	1	ls				\$ 4,000
Task 6 Total						\$ 210,200
Subtotal Task 1 3 4 6						\$ 799,800
Task 2 Mold Remediation in Basements	92	ea	200	200	\$ 400.00	\$ 316,400
MEP Construction Cost Total						\$ 1,116,200
General Conditions	10	%				\$ 111,620
Subtotal						\$ 1,226,720
<p>NOTE: THESE ARE MEP COSTS ONLY AND DO NOT INCLUDE MOLD ABATEMENT, ARCHITECTURAL ENCLOSURES, ROOF FLASHING AND REPAIR, PAINTING, OR 1st/2nd FLOOR ADMIN FLOOR WORK.</p>						