

SECTION 02850 – MOLD REMEDIATION

PART 1 - GENERAL

1.01 SUMMARY

In performing this project, all possible safeguards, precautions and protective measures shall be utilized to prevent exposure of any individual to mold particulates.

1.02 SCOPE

Provide mold remediation work including the handling and control of mold contaminated materials and the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with mold products and spores. The work also includes the disposal of any mold contaminated materials generated by the work. The mold removal work includes the demolition and removal of impacted drywall and associated building materials, located in the Securitas space. Provide containment and engineering control techniques as outlined in this specification.

The following microbial remediation specifications apply to the cleaning / removal and disposal of fungally-contaminated porous, semi-porous and non-porous surfaces within various types of structures. The level of containment and requirements for cleaning and remediation of materials will depend on the condition of the space and materials being remediated.

A microbial remediation plan must be prepared for approval by the Contractor's Environmental Consultant. Microbial remediation plan shall include an assessment of the risk for people to occupy areas adjoining the remediation area while remediation work is occurring.

This specification section includes the protocol regarding proper disposal of the removed building material components from within the work site.

Use proper cleaning procedures, engineering controls, and apply best management practices to remove microbial growth and spore fallout from all surfaces and building materials to minimize the further release of microbial spores. Address semi-porous and nonporous surfaces within the facility in each cleaning phase of the project. Damp wipe and HEPA vacuum all surfaces, at a minimum. Remove and dispose of porous building materials that are supporting microbial growth.

1.03 GENERAL REQUIREMENTS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

- A. AIHA IMOM08-679: (2008) Recognition, Evaluation, and Control of Indoor Mold.
- B. ASSE Z9.2: (2012) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems.
- C. IICRC S100: (2002) Standard Reference Guide for Professional Carpet Cleaning.
- D. IICRC S500: (2006) Standard and Reference Guide for Professional Water Damage Restoration.
- E. ACR: (2013) Standard for Assessment, Cleaning, and Restoration of HVAC Systems.
- F. 29 CFR 1910.134: Respiratory Protection.
- G. 29 CFR 1926.1101: Asbestos.
- H. UL 586: (2009) Standard for High-Efficiency Particulate, Air Filter Units.

1.04 DEFINITIONS

- A. AIHA: American Industrial Hygiene Association.
- B. AFU: Air filtration unit with High Efficiency particulate air (HEPA) filtered vacuum and / or exhaust ventilation equipment with a filter system capable of collecting and retaining microbial contamination ASSE Z9.2. Filters shall retain 99.97 percent of particles 1.2 by 10-6 inch or larger as indicated in UL 586.
- C. Categories of Water (IICRC S500)
 - 1. Category 1 Water: Water originating from a source that does not pose substantial harm to humans. Also referred to as "clean water."
 - 2. Category 2 Water: Water containing a significant degree of chemical, biological and/or physical contamination and having the potential to cause discomfort or sickness if consumed by or exposed to humans. Also referred to as "gray water."
 - 3. Category 3 Water: Grossly unsanitary water, containing pathogenic agents, arising from sewage or other contaminated water sources and having the likelihood of causing discomfort or sickness if consumed by or exposed to humans. This category includes all forms of seawater, ground surface water and rising water from rivers or streams. Also referred to as "black water."

- D. Complete Interior Building Demolition (Complete Gut): Interior finishes of the building have been removed to expose basic structural elements.
- E. Containment: Physical separation and engineering controls required to prevent contamination of undamaged materials and occupied areas. The level of containment varies depending on the extent of the contamination.
 - 1. Source Containment: Use when the contaminated surface area is less than 10 square feet, in non-residential buildings only. At a minimum, source containment shall include the following:
 - a. Isolation of Work Areas. Install polyethylene barriers to isolate the areas or material to be demolished / remediated from non-remediation areas.
 - b. Floor protection. Maintain protection for finished floors through all construction activities.
 - c. HEPA vacuum to control dust created during the demolition. Hold HEPA vac intake at source of dust.
 - 2. Limited Containment: Use when contaminated surface area is between 10 square feet and 100 square feet per room in non-residential buildings and contaminated surface area less than 100 square feet per room in residential buildings. At a minimum, limited containment shall include the following:
 - a. Containment. For residential buildings, a containment shall include the entire room where work is being performed. The containment shall not extend past the extents of the room unless there are instances of contamination extending from one room to the next. For non-residential buildings, the containment shall include the area to be remediated, plus enough additional area to allow for all equipment and work activities.
 - b. Isolation of Work Areas. Install polyethylene barriers to isolate the areas to be demolished / remediated.
 - c. Floor protection. Maintain protection for finished floors through all construction activities.
 - d. Air Filtration / Pressurization Control. Install AFUs with HEPA filters in the containment. Configure the AFUs with splitters / diverters to allow some of the air to recirculate within the containment. Discharge the remainder of the air directly to the outside to maintain an overall negative pressure in the containment of 0.02 inch water column

minimum to 0.04 inch water column maximum relative to the outside and other adjacent spaces not undergoing remediation. AFUs shall filter a minimum of four air changes per hour and a maximum of six air changes per hour.

- e. Protection for all items remaining in the containment. Protective devices shall prevent physical damage (e.g., scratches and dents) and shall provide a positive seal to prevent dust from settling in or on the items.
 - f. Containment Entrance. Install a triple-flap poly "door" to be used during demolition to minimize egress and provide a good separation between containment and occupied areas of the house / building.
3. Full Containment: Use when contaminated surface area is greater than 100 square feet in both residential and nonresidential buildings. At a minimum, full containment shall include the following:
- a. Containment. For residential buildings, a containment shall include the entire room where work is being performed. The containment shall not extend past the extents of the room unless there are instances of contamination extending from one room to the next. For non-residential buildings, the containment shall include the area to be remediated, plus enough additional area to allow for all equipment and work activities.
 - b. Isolation of Work Areas. Construct polyethylene barriers to isolate the areas to be demolished / remediated.
 - c. Floor protection. Maintain protection for finished floors through all construction activities.
 - d. Air Filtration / Pressurization Control. Install AFUs with HEPA filters in the containment. Configure the AFUs with splitters / diverters to allow some of the air to recirculate within the containment. Discharge the remainder of the air directly to the outside to maintain an overall negative pressure in the containment of 0.02 inch water column minimum to 0.04 inch water column maximum relative to the outside and other adjacent spaces not undergoing remediation. AFUs shall filter a minimum of four air changes per hour and a maximum of six air changes per hour.

- e. Protection for all items remaining in the containment. Protective devices shall prevent physical damage (e.g., scratches and dents) and shall provide a positive seal to prevent dust from settling in or on the items.
 - f. Decontamination. Construct a decontamination airlock for entry into and exit from the work area. The airlock shall be used to HEPA vacuum the sealed bags of contaminated debris. When possible, the decontamination airlock shall be located so that the sealed bags can be passed directly from the airlock to the outside, through a door or window.
 - g. Containment Entrance. Install a triple-flap poly "door" at the entrance to the airlock, and between the airlock and the work area during demolition to minimize egress and provide a good separation between containment and occupied areas of the house / building.
4. Unoccupied Building Containment: Use when a building is unoccupied and large amounts of mold growth are present throughout the building:
- a. Containment. The containment consists of the entire building. Install AFUs with HEPA filters in the building. Configure the AFUs to recirculate within the active remediation area. AFUs shall filter a minimum of four air changes per hour and a maximum of six air changes per hour based on the size of the area undergoing active remediation.
 - b. Isolation of Work Areas. Install polyethylene barriers to isolate the areas where remediation is not required. AFU discharge may be used to positively pressurize non-remediation areas from areas undergoing remediation to prevent the movement of spores into "clean" areas.
 - c. Floor Protection. Maintain protection for finished floors through all construction activities.
 - d. Protection for all items remaining in the containment. Protective devices shall prevent physical damage (e.g., scratches and dents) and shall provide a positive seal to prevent dust from settling in or on the items.
 - e. Decontamination. Construct a decontamination airlock for entry into and exit from the building.

- f. Containment Entrance. A triple-flap poly "door" shall be used at the entrance to the work area during demolition to minimize egress.
5. Cleaning Containment: A temporary containment structure set up to clean items removed from the containment. At a minimum, the cleaning area shall contain:
 - a. Two chambers. Construct walls with polyethylene. Items will be cleaned in the first chamber. The clean items shall be stored in the second chamber.
 - b. Air Filtration / Pressurization Control Cleaning Chamber. Install AFUs with HEPA filters in the cleaning chamber. Configure the AFUs with splitters / diverters to allow some of the air to recirculate within the containment. Discharge the remainder of the air directly to the outside to maintain an overall negative pressure in the containment of 0.02 inch water column minimum to 0.04 inch water column (maximum) relative to the storage chamber.
 - c. Air Filtration, Storage Chamber. Install AFUs with HEPA filters in the storage chamber. The AFUs shall be configured to allow air to recirculate within the chamber. AFUs shall filter a minimum of four air changes per hour and a maximum of six air changes per hour.
 - d. Containment Entrance. Install a triple-flap poly "door" at the entrance to the cleaning chamber, between the cleaning and storage chambers, and at the exit of the storage chamber to minimize egress and provide a good separation between the chambers.
6. Decontamination Unit (Airlock): An enclosed area adjacent to, and connected to, a regulated work area. It consists of various rooms that are used for the decontamination of workers, equipment, and materials.
7. Dehumidifier: Mechanism or machine to remove moisture from the air.
8. Detergent: A cleaning agent. The term refers to a prepared compound that may include surfactants, builders, dry solvents, softeners, etc, but does not include true soap.
9. Disinfectants or Biocide Sanitizing Solutions: One of three groups of antimicrobials registered by the EPA for public health uses. The EPA considers an antimicrobial to be a disinfectant when it

destroys or irreversibly inactivates infectious or other undesirable organisms, but not necessarily their spores.

10. EPA: U.S. Environmental Protection Agency.
11. Fungicidal Agents, (EPA): A coating material that contains an EPA registered fungicide that inhibits the spread and growth of mold with the ability to withstand moist and humid conditions.
12. HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97 percent of all particulate larger than 1.2 by 10-6 inch.
13. HVAC: Heating, Ventilating, and Air Conditioning (System).
14. Microbial Remediation Supervisor: Individual responsible for the execution of the microbial remediation work as defined by the scope of work. This individual shall have documented training in microbial remediation and have at least three years experience in microbial remediation work. Remediation contractor's on-site supervisor shall have one of the following certifications: Council-Certified Mold Remediator (CMR), or Council-Certified Mold Remediation Supervisor (CMRS) as certified by the American Council for Accredited Certification, or Applied Microbial Remediation Specialist (AMRS), Institute of Inspection, Cleaning, and Restoration Certification (IICRC) or equivalent.
15. Non-Porous Material: A material that does not absorb nor is easily penetrated by liquids, especially water. Generally, non-porous materials have a permeable factor of less than 1. Some examples are metal, glass, plastic, ceramic tile, etc.
16. Occupied Spaces (Areas): The phrase "occupied space" within this specification refers to spaces that are occupied by unprotected non-remediation personnel while work is in progress. It also refers to areas adjacent to work areas that are not currently undergoing remediation.
17. Personal Protective Equipment (PPE): Any material or device worn to protect a worker from exposure to, or contact with, any harmful material or force. PPE must be cleaned or disposed of prior to removal from the remediation work area.
18. Poly: Polyethylene sheet with a minimum thickness of 6 mils.
19. Porous Material: Permeable materials having the physical properties that allow liquids or gasses to pass through. These materials include but are not limited to the following: gypsum wall

board, insulation, wallpaper, ceiling material, carpet, padding, paper goods (i.e., cardboard boxes, loose paper, books, etc.), stuffed furniture, wicker, fabrics, etc.

20. Pressure Differential Measuring Instrument: Device used to measure the relative pressure difference between the work area and areas outside the work area. For mold remediation, the device must measure accurately in the 0 to 0.04 inch range.
21. Semi-porous Material: A material that can absorb liquids if exposed over long periods of time. These materials include but are not limited to wood, concrete, linoleum, vinyl wall covering, wooden or hardboard furniture, plaster, etc.
22. Ventilation System Mold Remediation Qualifications (VSMR): An individual certified by the North American Duct Cleaning Association (NADCA) to clean HVAC systems.
23. Work Area: The area where remediation operations are actively performed and controlled to prevent the spread of dust / spores and entry by unauthorized personnel.

1.05 SUBMITTALS

- A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work to the Engineer for review prior to commencement of work. Include coordination for temporary shut-off and continuation of utility services as required, together with details for dust and noise control protection.
- B. Preconstruction Submittals: Within ten (10) days from the award of the contract and prior to the start of the work, submit to the Engineer six copies of the following items for review and permanent file.
 1. Microbial Remediation Plan: Submit a job-specific, Mold Remediation Plan approved by the Contractor's Environmental Consultant to the Engineer for final approval prior to start of work. The plan shall address the following items at a minimum:
 - a. Description of materials to be remediated, providing location and quantities (map if available), and methods to be used for remediation.
 - b. Types of biocides and fungicidal agents.
 - c. Containment procedures to include description and locations of engineering controls and decontamination unit to include entry and exit procedures (provide sketch of

floor plan showing location of containment barriers and decontamination units). Plan shall include locations of AFUs and AFU discharges to the outside.

- d. Description of personal protective equipment to be used during the remediation.
 - e. Construction barricades and barriers in occupied areas.
 - f. HVAC Shut down and start-up procedures.
 - g. HVAC Evaluation and remediation procedures.
 - h. Moisture and relative humidity control procedures and equipment.
 - i. Packaging and disposal procedures.
 - j. Safety Precautions to include lockout / tag-out, fall protection, confined space entry procedures, and fire protection.
 - k. Description of the method to be employed to control cross contamination of areas not in the work area. This shall include a risk assessment related to the suitability of people to occupy areas adjoin the remediation area while remediation activities are ongoing.
 - l. Quality Control procedures to include visual inspection.
 - m. Procedures to control, abate, and dispose of Lead Based Paint (LBP) coincident with microbial remediation.
2. Respiratory Protection Program: Provide written copy of Contractor's Respiratory Protection program.
 3. Worker Records: Provide the following documents for all workers, including supervisory personnel. If new workers are added to the crew, provide the same documentation for them.
 4. Employee Instruction and Release Form: Provide documentation showing that each employee has been instructed on the following items:
 - a. Use and fit of respirators (for employees entering and working in the containment).
 - b. Protective clothing.

- c. Protective measures.
 - d. Safety and Emergency Egress Procedures.
 - e. Site specific fall protection plan and training.
 - f. Microbial remediation hazards and practices including engineering controls and isolation. Training should include "hands on" training for microbial remediation supervisors.
 - g. Workers' release forms stating the potential hazards involved with the scope of the work.
 - h. Worker Training Certification: Submit copies of training certificates for each employee indicating that the employee has received training at the appropriate level for the work prescribed in the description of work.
5. Microbial Remediation Supervisor Qualifications: Onsite supervisor shall have one of the following certifications: Certified Mold Remediator (CMR), Certified Mold Remediation Supervisor (CMRS), or Applied Microbial Remediation Specialist (AMRS). Submit copies of supervisory training certificates.
- C. Product Data: Within 10 days of contract award, submit product data for items identified for use in Microbial Remediation Plan.
- D. Daily Reports: Prepare a written report for each day that microbial remediation work is being accomplished. Submit this report to the Engineer by 1000 hours of the following day, attached to the Contractor Quality Control Report. Referred to collectively as the Daily Report, the report at a minimum shall include measurements of differential pressure and temperature and relative humidity in work areas, and detail any non-compliance issues observed.
- E. Submittals at Completion of Remediation Work: Within 14 days of completion, provide the following information:
- 1. Supervisor Logs.
 - 2. Daily Reports.
 - 3. Photographic Logs.
 - 4. Contractor's Industrial Hygienist Report certifying the microbial remediation is complete.

- 1.06 RECORD KEEPING: A Daily Project Log shall form a permanent record of the project. Secure and maintain these logs and any other required documentation as part of the permanent project file.

Daily Log: The Microbial Remediation Supervisor shall maintain a Daily Project Log. The Daily Project Log shall be used each day of the project to document the following information.

1. Date.
2. Name of Microbial Remediation Supervisor.
3. Name of Industrial Hygienist monitoring work area.
4. Number of workers on site.
5. Equipment utilized.
6. Brief description of daily work activities.
7. Listing of any non-compliance noted, emergencies, stop work orders (with detailed explanation), and descriptions of any other significant events.

PART 2 - PRODUCTS

- 2.01 DISINFECTANTS, BIOCIDES, SANITIZING SOLUTIONS AND FUNGICIDAL AGENTS, (EPA): Shall be approved by EPA for the use detailed in the Microbial Remediation Plan and used in accordance with the manufacturer's specifications.

PART 3 - EXECUTION

- 3.01 EQUIPMENT: Provide protective clothing and respirators as required by the Microbial Remediation Plan for use by any authorized visitors. Provide manufacturer's certificate of compliance for all equipment used to contain the microbial contamination. Contractor shall not be required to certify that visitors entering work areas be capable of wearing respirators.
- A. Respirators: Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. Provide personnel engaged in set-up, pre-cleaning, cleanup, handling, and removal of contaminated materials with the appropriate respiratory protection as specified in 29 CFR 1910.134. Microbial remediation plan shall consider Table 17.1 in AIHA IMOM08-679 "Recognition, Evaluation, and Control of Indoor Mold", which lists the minimum levels of respiratory protection based on the activity and size of the remediated area.

- B. Protective Clothing: Provide all workers with protective clothing as appropriate for the work being accomplished, as required by the Microbial Remediation Plan.

Do not permit any person to enter the work area without the appropriate protective clothing and equipment.

- C. Warning Signs and Labels: Provide bilingual warning signs printed in English and Spanish at all approaches to the work areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Warning signs may be in the form of continuous plastic tape. The warning signs shall have black characters on a yellow background.

WARNING
DO NOT ENTER
MICROBIAL REMEDIATION WORK IN PROGRESS

Alternate wording for the warning signs will be approved by the Engineer.

- D. Dehumidifiers: Install and use dehumidifiers as needed during the remediation to maintain relative humidity below 60 percent in the work area. Drain the condensate water to a permanent drain, or empty as needed to prevent water overflowing from the dehumidifiers.
- E. Air Filtration Units (AFU): Install and use AFUs with HEPA filters, and manufacturer specified pre-filters, as part of the exhaust ventilation system to develop and maintain the specified desired air pressure differential inside the enclosed work area relative to the outside areas. The Contractor shall be responsible for acquiring and paying for any licenses needed for use of any equipment, including but not limited to, air pressure differential systems and air filtration systems.

Replace HEPA filters and pre-filters for AFUs as required to maintain pressurization performance requirements during demolition and cleaning. Do not reuse filters. Bag used filters at a minimum in clear 6 mil polyethylene bags within the containment and disposed as contaminated waste.

Discharge air from any AFUs located in the work area containment to the outside environment when creating a negative pressure containment to create a negative pressure relative to occupied areas of 0.02 inch H₂O to 0.04 inch H₂O. Discharge air in excess of that required for creating the proper negative pressure to the work area. The AFUs shall provide four to six air changes per hour in the work area. Under no circumstances may air from AFUs discharge to an occupied area. Coordinate location of window sashes or doors required for discharge openings with the

Engineer. Seal around openings used for discharge of exhaust air airtight. Exhaust discharge openings may be constructed of plywood.

Seal all exhaust and intake openings in AFUs with one layer of 6-mil polyethylene sheeting when not in use.

- F. Vacuum Cleaners Equipped with HEPA Filters: Provide vacuum cleaners equipped with HEPA filters designed for continuous operation to perform the work in a timely and efficient manner.

Provide nozzle attachments as required to adequately remove all dust. As a minimum, nozzle attachments shall include crevice and extended bristle brush nozzles. Any vacuum that is not equipped with a HEPA filter shall not be used at anytime.

Provide sufficient vacuum cleaners equipped with HEPA filters designed for continuous operation in the work area during microbial remediation inside the containment area.

Provide additional vacuum cleaners equipped with HEPA filters in the enclosed work area during remediation or cleaning work as required by the size (area) of the containment and to maintain timely progress of the work.

3.02 GENERAL REQUIREMENTS

- A. Pre-Microbial Remediation Work Conference: Meet with the Engineer prior to beginning work to discuss in detail the Microbial Remediation Plan, including work procedures and safety precautions. Once approved by the Engineer, the plan shall be enforced as if a part of this specification. Any variances to the specification as a result of the plan shall be specifically identified to allow for free discussion and approved by the Engineer in writing prior to starting work. Before work in areas containing Asbestos Containing Material (ACM) and Presumed Asbestos Containing Materials (PACM) and Lead is begun, Contractor shall identify the presence, location, and quantity of ACM, PACM and Lead. Ensure proper notification of regulatory authorities. Contractor shall consult with Engineer to obtain facility ACM / LBP surveys.
- B. Containment Entry / Exit Procedure: Ensure that each worker and authorized visitor follows entry and exit procedures detailed in the Microbial Remediation Plan.

3.03 REMOVAL PROCEDURES

- A. Protection of Existing Work Areas: Perform work in a manner to minimize the damage or contamination to areas outside or directly adjacent to the work area. Contractor is required to inspect areas inside and outside

proposed work areas to identify existing damage and notify Engineer prior to start of work.

Where materials outside work area are damaged or contaminated as a result of the Contractors work efforts as verified by the Engineer using visual inspection or sample analysis, it shall be restored to its original condition or decontaminated by the Contractor at no expense to the DOT as deemed appropriate by the Engineer. Should adjacent or outside areas become contaminated as a result of the Contractors work efforts the work shall stop immediately. The newly contaminated areas shall be cleaned and verified by visual inspection by the Environmental Consultant. The work may proceed at the discretion of the Engineer once the area has been verified as restored.

- B. Remediation of Fungally Contaminated Building Materials: The removal of contaminated materials shall follow in general the listed sequence of work. The Contractor may make changes to improve work flow with the approval of the Engineer.
1. Provide level of containment and PPE required by the Microbial Remediation Plan.
 2. Disable all HVAC units and exhaust fans in the area to be remediated.
 3. Protect materials to remain in work area. Where possible, all materials to be salvaged should be cleaned in place to prevent possible cross-contamination created by moving materials through non-remediation areas.
 4. Remove undamaged items and materials to be cleaned and salvaged from the work area. Materials shall be stored in an area with relative humidity maintained below 60 percent and where temperatures will not damage the material. Notify Engineer of existing damage to items prior to removal.
 5. Set up containments, including protection of materials remaining within the containment and AFUs. Notify Engineer that the area is prepared for remediation activities.
 6. Pre-demolition inspection by the Environmental Consultant and/or Engineer.
 7. Demolition and removal / cleaning of contaminated materials.
 8. Post-remediation inspection by the Environmental Consultant and/or Engineer.

9. Perform final cleaning in the containment.
 10. Clean carpet in the containment.
 11. Clearance inspection by the Environmental Consultant and/or Engineer.
 12. Duct and HVAC cleaning, if necessary.
 13. Deconstruction of containment, removal of AFUs.
 14. Clean previously removed items prior to returning to occupied area.
- C. Remediation Procedures: Procedures for remediation depend on the amount of mold growth and the type of material with fungal growth.
1. Remediation of Non-Porous Materials: The method of remediating non-porous items shall be:
 - a. HEPA vacuum all surfaces.
 - b. Damp wipe all surfaces using clean water or a detergent solution.
 2. Semi-Porous Materials (Unfinished Wood): The method of remediating unfinished wood-based items, including wood and wood framing in wall cavities, shall be:
 - a. Cleaning:
 - (1) HEPA vacuum all surfaces.
 - (2) Scrub surfaces with a brush and detergent to remove mold.
 - (3) HEPA vacuum all surfaces to remove dust.
 - (4) Repair finishes as required to match original.
 - b. Removal: Where unfinished wood product has been structurally damaged, remove and replace with an equivalent product. This shall include wall studs and sheathing, such as OSB used in flooring, wall, or roof construction.

3. Semi-Porous Materials: The method of surface cleaning semi-porous materials such as concrete, vinyl wall covering, linoleum, leather furniture, and finished wood products shall be:
 - a. HEPA vacuum all surfaces.
 - b. Damp wipe surfaces with using clean water or a detergent solution. Avoid over-wetting the material.

4. Porous Materials
 - a. Carpet:
 - (1) Removal: Replace carpet that has remained wet for 48 hours or longer.
 - (2) Cleaning: Use a dry absorbent compound cleaning method as designated by IICRC S100. This method uses an absorbent compound to dissolve, suspend and absorb carpet soils. It does not add moisture back into the carpet.
 - b. Gypsum Wallboard (GWB):
 - (1) Removal: Replace Gypsum Wallboard that has remained wet for 48 hours or longer, or has visible mold growth. Where removal of GWB exposes insulation, remove and replace the insulation with an insulation having equal characteristics for insulating value and permeability.
 - (2) Surface Cleaning: Where GWB has a small amount of surface mold growth and the GWB is structurally sound, a surface cleaning method may be used with the permission of the Environmental Consultant and/or Engineer. The method of surface cleaning GWB shall be HEPA vacuum all surfaces. Surface cleaning shall not be used where mold growth penetrates wallboard substrate.
 - c. Ceiling Tile:
 - (1) Removal: Replace ceiling tile that has remained wet for 48 hours or longer, or has visible mold growth.

- (2) Surface Cleaning: Where settled dust on ceiling tiles contains mold spores and the ceiling tile is structurally sound, is not sagging, and has not been wet, a surface cleaning method may be used with the permission of the Environmental Consultant and/or Engineer. The method of surface cleaning ceiling tile shall be HEPA vacuum all surfaces. Surface cleaning shall not be used where mold growth is occurring on ceiling tiles.
- d. Paper Materials: Discard paper materials that have remained wet for 48 hours or longer, or that have visible mold growth.
 - e. Textiles:
 - (1) Discard textiles with visible mold growth.
 - (2) Clean textile based items, including clothing, linens, and toys that do not have visible mold growth, but have been wet, in standard commercial or residential washing machines with standard washing machine detergent.
 - (3) Dry all items completely before returning to the building / house.
 - (a) When possible, use dryers to dry items.
 - (b) If dryers will cause irreversible harm to the item, hang the item on a drying rack in a temperature and humidity controlled space. Discard items not dry within 48 hours.
 - f. Upholstered Furniture:
 - (1) Removal: Discard upholstered furniture that has remained wet for 48 hours or longer, or that have visible mold growth.
 - (2) Cleaning: Clean upholstered furniture that has been exposed to mold spores but does not have visible mold growth by HEPA vacuuming upholstery and wood or metal structure, followed by a damp wipe of semi-porous or non-porous portions of the furniture.

3.04 DETAILED SEQUENCE OF WORK FOR MOLD REMOVAL UNDER CONTAINMENT

A. Preparation for Remediation Work:

1. Provide level of containment and PPE required for the remediation based on the Microbial Remediation Plan.
2. Disable all HVAC units and exhaust fans in the area to be remediated.
3. Remove undamaged materials from the work area if they are to be salvaged but cannot be cleaned in place. Store materials in an area with relative humidity maintained below 60 percent and where temperatures will not damage the material. Notify Contractors Engineer of existing damage to items prior to removal. Clean materials using procedures detailed in Remediation Procedures.
4. Remove supply diffusers, return grilles and exhaust grilles. Clean diffusers and grilles using procedures detailed in Remediation Procedures.
5. Construct containment barriers. Existing walls can be used as a portion of the containment barriers if existing openings in walls (such as doors, wall openings, vents, etc.) are sealed using polyethylene.
6. Install the AFUs and dehumidifiers.
7. Seal supply, return, and exhaust openings with polyethylene sheeting and protect intakes to air handling units. Air handling units shall remain off.
8. Install all equipment needed for removal work in the containment area to minimize egress during demolition.
9. The Environmental Consultant will inspect the containment to verify that the containment is properly constructed and the containment area has an overall negative pressure of 0.02 to 0.04 inch water column relative to the outside and adjacent work areas not undergoing active remediation, prior to beginning demolition work.

B. Demolition:

1. Remove mold contaminated materials to be discarded, such as paper, and furniture. Double bag material in 6 mil poly bags. Seal poly bags using duct tape inside the containment. HEPA vacuum bags before removing them from the containment or airlock. When possible, pass the bags directly from the containment or airlock to the outside. Transport bags to a dumpster. Do not leave the bags at the building / house.
2. Remove contaminated gypsum wallboard (GWB) at the preliminary limits of demolition specified in the Microbial Remediation Plan. Inspect back side of removed GWB. If mold is observed on the back side of the GWB, report this condition to the Environmental Consultant. Continue removing GWB until no mold is observed. If hidden mold is discovered that will extend past the extents of the containment, stop work immediately and reconstruct the containment to extend past the suspected contamination. Re-evaluate level of containment and PPE. Continue to operate AFUs during reconfiguring of containment.
3. Remove drywall by cutting in pieces as large as possible to minimize aerosolization of fungal spores. Drywall screws can either be backed out during removal or later during cleanup.
4. Use dust collection attachments on all power tools, such as sanders, saws, etc., to capture dust created when using the tools. Outlet of dust collector should discharge into inlet of AFU.
5. Remove fiberglass insulation behind removed gypsum board.
6. If wood studs are contaminated, scrub them with a brush and detergent to remove mold. Replace wood studs with damage severe enough to reduce the structural capacity of the member. Prior to removal of any structural member consult with the Engineer.
7. Clean all metal framing with a dilute detergent solution. Clean metal framing with light rust using steel wool and coat with a rust inhibiting paint. Replace metal framing with rust damage severe enough to reduce the structural capacity of the member. Prior to removal of any structural material, consult with the Engineer.
8. Remove contaminated carpet scheduled for removal.
9. Place removed gypsum board, insulation, carpet and remaining debris in two layers of 6 mil poly bags. Seal poly bags using duct

tape inside the containment. HEPA vacuum bags before removing them from the containment or airlock. When possible pass the bags directly from the containment or airlock to the outside. Transport bags to a dumpster. Do not leave the bags at the building / house. Remediation workers shall HEPA vacuum their PPE, then remove them within the airlock chamber. Discard disposable coverall suits into a 6 mil poly bag.

C. Post-Demolition Inspection:

1. The Environmental Consultant will inspect the containment area to verify that all contaminated materials have been removed.
2. Allow a minimum of 12 hours after completion of removal work, with AFUs operating, for airborne dust in the containment to settle and / or be removed by the AFUs.

D. Cleaning after Demolition, and Cleaning of Settled Spores from Porous / Non-Porous Materials:

1. Continue to operate AFUs during cleaning.
2. Clean exposed surfaces.
 - a. HEPA vacuum all surfaces.
 - b. Damp wipe all non-porous exposed surfaces including polyethylene sheets used to protect materials, external surfaces of ductwork, studs, and floors with clean rag and clean potable water or detergent solution.
 - c. Remove poly sheeting inside the containment.
 - d. HEPA vacuum all surfaces protected by poly sheeting.
 - e. Damp wipe non-porous surfaces protected by poly sheeting with clean water or a detergent solution.
 - f. Clean carpet using procedures in Remediation of Fungally Contaminated Building Materials.
3. Final clearance inspection will be conducted by the DOT Environmental Consultant. Clearance inspections will be performed using the procedures detailed in Post-Remediation Inspection. Maintain containments in place until spaces are inspected and accepted by the DOT Environmental Consultant as being fully remediated. If final clearance does not pass, the Contractor shall conduct additional cleaning and repeat the clearance process.

3.05 DUCT AND HVAC SYSTEM CLEANING

A. Contractor Qualifications:

1. The HVAC cleaning contractor shall be a certified member of NADCA.
2. The HVAC cleaning contractor shall have at least one individual with Ventilation System Mold Remediator Qualifications certified by NADCA onsite during duct and HVAC system cleaning.

B. Inspection: Environmental Consultant shall visually inspect the HVAC system serving all work areas and determine if additional remediation is needed to clean the HVAC system, thus preventing re-contamination.

1. Follow requirements of the NADCA ACR "Standard for Assessment, Cleaning, and Restoration of HVAC Systems".
2. Using a "gassing" or "fogging" method of cleaning with gaseous chlorine dioxide or ozone will not be allowed.
3. Disable all HVAC equipment prior to cleaning any component of the system.
4. The method of cleaning the air handling units, terminal units, blowers and exhaust fans shall be:
 - a. Construct a limited containment around equipment to be cleaned. Provide appropriate PPE for workers.
 - b. Remove filters. Seal filters in 6 mil poly bags for disposal.
 - c. Disassemble units as necessary to clean components. Contractor is responsible for reassembling equipment after cleaning.
 - d. Clean disassembled components within the containment or in a separate two chamber cleaning containment. Seal disassembled components in 6 mil poly bags for transport out of building / house.
 - e. HEPA vacuum all surfaces.
 - f. Damp wipe all non-porous surfaces and components with clean water or a detergent solution.
5. The method of cleaning HVAC coils shall be:

- a. Clean coils using a method which will render the coil visibly clean. Coil cleaners shall be non-acidic / alkaline, detergent based. Clean condensate drain pans. The drain for the condensate drain pan shall be operational during the cleaning.
 - b. Rinse coils and drain pans with clean water to remove any latent residues.
 - c. Cleaning methods shall not cause damage to the coil surface or fins.
 - d. Cleaning must restore the coil pressure drop to within 10 percent of the pressure drop measured when the coil was first installed. If the original pressure drop is not known, the coil shall be considered clean only if the coil is free of foreign matter and chemical residue.
6. The method of cleaning the duct system shall be:
- a. During cleaning, connect a vacuum collection system to the downstream end of the section being cleaned. The vacuum collection device must be of sufficient power to render all areas of duct being cleaned under negative pressure relative to rooms and areas of duct not being cleaned. Negative pressure must be verified at the furthest point from the collection system with a micromanometer and verification measurements included in the Daily Report.
 - b. Equip the vacuum collection systems with HEPA filters. Exhaust the vacuum collection systems directly to the outside.
 - c. Use mechanical agitation devices to dislodge debris adhered to the ductwork, such that debris may be safely conveyed to vacuum collection devices. Cleaning methods shall not damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork.
 - d. HEPA vacuum duct surfaces.
 - e. When possible, damp wipe metal duct surfaces with clean water or detergent solution. Do not wet fibrous glass thermal or acoustical insulation.

f. Identify areas where there is evidence of damage to or uncleanable mold in duct insulation. The Environmental Consultant and/or Engineer will make the decision to discard the insulation, if necessary.

7. Final clearance of HVAC and duct system will be based on a visual assessment (no visible dust, no visible mold) by the Environmental Consultant.

3.06 FIRE PROTECTION: The Contractor shall provide portable fire extinguishers within the containment area and outside the decontamination unit. Fire extinguishers shall be rated for the class of fire hazards in the work area and shall be sized for coverage of the areas within the containment. At a minimum, one 10-pound ABC fire extinguisher for every 1,000 square feet shall be strategically placed around the containment. Personnel shall be trained for emergency egress and the use of fire extinguishers. Notify fire officials of work activities as required.

3.07 CONSTRUCTION BARRIERS

- A. Provide interior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain. Shoring, bracing or support will be necessary when structural wood studs or metal framing need to be removed and replaced when they cannot be cleaned.
- B. Do not disturb microbial-contaminated building materials while isolating work areas. This precaution prevents the release of microbial spores.
- C. Workers shall wear respirators and other PPE as outlined in the microbial remediation plan when installing critical barriers where microbial contaminated surfaces (walls or surfaces with visible settled dusts) are likely to be disturbed. Operate an AFU if disturbance is likely during setup.
- D. Monitor the air pressure differential across work area containments. The monitoring system shall be in place before the start of remedial activities. Verification by the Industrial Hygienist is required prior to the start of the microbial remediation.

3.08 QUALITY ASSURANCE / QUALITY CONTROL REQUIREMENTS

- A. Contractor Qualifications: Work shall be performed by a qualified remediation contractor. Contractor shall carry insurance that specifically covers mold remediation.

Remediation contractor's on-site supervisor shall have one of the following certifications: Certified Mold Remediator (CMR), Certified Mold Remediation Supervisor (CMRS), or Applied Microbial Remediation Specialist (AMRS). Qualified supervisor shall be onsite whenever active remediation is being performed. Set-up activities may be performed without supervisor present; qualified supervisor shall review set-up prior to start of work.

Mold remediation workers shall be given training in PPE and mold remediation activities as required for their particular job. Microbial remediation plan shall provide details of worker training.

- B. Waste Management and Removal: Keep the site and work area free from accumulations of dust, waste materials, or rubbish caused by Contractor operations and free from any flammable materials or other sources of fire hazard. Remove all waste materials and rubbish from and about the work site in strict accordance with the specifications and applicable codes and regulations.
- C. Post-Remediation Inspection: Clean up all debris and dust in interior spaces outside the work area resulting from the Contractor's remediation work.

After all visible accumulations of material and debris are removed from the containment, provide the Environmental Consultant a 24-hour notice for a final clearance visual inspection. The Environmental Consultant and/or Engineer shall conduct a thorough visual inspection of the work area. If during this inspection any visible debris and/or microbial contamination are observed, the Contractor shall re-clean the work area without additional cost.

- D. Clearance:
 - 1. Clearance Criteria: Clearance will be based on visual assessment (all visible mold removed, all visible dust removed, based on a "white glove" test) by Environmental Consultant and/or Engineer. "White glove" test shall consist of wiping the surface with a clean cloth of color suitable to reveal expected type of dust. For most surfaces, a white cloth is suitable. For GWB dust, a dark cloth may be more appropriate.
 - 2. Failed remediation areas will be recleaned and the AFUs kept in operation another 12 hours, followed by another visual assessment. Subsequent failures will follow the same routine until a pass condition is secured.

3.09 CLEAN-UP AND DISPOSAL

- A. Disposal of Material: Dispose of contaminated bagged waste materials removed during this remediation as general construction debris. Follow all applicable local, State, and Federal requirements for the disposal of this material.
- B. Material Packaging: Place waste, as waste is removed, into a disposal container promptly. Disposal containers shall consist of at a minimum, two layers of clear 6 mil polyethylene bags. Tape bags in a gooseneck fashion to form an airtight seal and label appropriately. Bag waste from vacuums equipped with HEPA filters in 6 mil polyethylene bags.
- C. Building Exit (Waste Disposal): HEPA vacuum and damp wipe bags of contaminated waste material prior to removal from the building.
- D. Hazardous Material: Should the Contractor encounter any hazardous materials, notify the Environmental Consultant and/or Engineer immediately for direction.

PART 4 - MEASUREMENT AND PAYMENT

4.01 METHOD OF MEASUREMENT

Work under this Section will not be measured for payment but will be paid for at the Contract Lump Sum Price.

| <u>Item No.</u> | <u>Item</u> | <u>Unit</u> |
|-----------------|------------------|-------------|
| 02850.1 | Mold Remediation | Lump Sum |

END OF SECTION