

**SECTION 01 3533  
INFECTION CONTROL PROCEDURES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. Section includes policies and procedures required of the Contractor to prevent transmission of infectious agents, dust, particles and other airborne particulate to vulnerable patient populations, health care workers and visitors within the Hospital and clinical environments.

**1.03 RELATED REQUIREMENTS:**

- A. Document 01 3523 - Owner Safety Requirements
- B. Document 01 5000 - Temporary Facilities and Controls; for additional procedures and construction of temporary barriers.
- C. Division 15 Sections for cleaning heating, ventilation and air-conditioning systems and ductwork prior to operation.
- D. Spectrum Health Water Safety Management Plan

**1.04 DEFINITIONS**

- A. **Aspergillus:** A thermotolerant fungus that causes significant disease among immunocompromised hosts that will disseminate to other organs including the skin and the brain. These fungi are ubiquitous, found in soil, water, dust and decaying material. Aspergillus have been cultured from unfiltered air, ventilation systems, contaminated dust dislodged during hospital renovation and construction, horizontal surfaces, food, and ornamental plants. Aspergillus spores are easily suspended in the air and survive for prolonged periods. Because of their size, they are easily inhaled, which can lead to invasive infection of both the upper and lower respiratory tracts in a susceptible host.
- B. **Biocide:** A physical or chemical agent that is capable of killing microorganisms.
- C. **Immunocompromised:** A condition where a patient's immune response is reduced or absent. Because defense mechanisms are limited in immunocompromised patients, they are susceptible to infections by microorganisms that are present everywhere, but do not cause disease in healthy people.
- D. **Hospital Acquired:** An infection that is acquired in a hospital or as a result of medical care.
- E. **Negative Pressure:** The relative air pressure difference between two areas in a healthcare and clinical facilities. A space that is at negative pressure has a lower pressure than adjacent areas, ensuring that any directional air movement is from the clean air environment into the contained area and preventing contaminated air from escaping into adjacent rooms or areas through doors, openings and cracks.
- F. **HEPA:** An acronym that stands for high efficiency particulate air. A HEPA filter is an air filter capable of capturing 99.97% of particles as small as .3 microns.
- G. **Multi-Stage Filtering:** Successive, filtering that prevents early loading of filters with contaminants and thereby delaying reduced airflow. Typical multi-stage filters might consist of a large particulate filter (10 microns), a smaller particulate filter (5 microns), an activated charcoal filter (odors) and a HEPA filter (.3 microns).
- H. **Negative Pressure Machine:** Freestanding, portable device that creates a negative air pressure within a space. It does so by removing air via flexible ductwork from the containment area. The units can also be placed remotely from the containment area and use ductwork to remove air from the controlled environment.
- I. **Portable Air Scrubber:** Freestanding, portable device that removes airborne contaminants by recirculating air through a HEPA filter. Portable air scrubbers can also serve as negative

pressure machines by exhausting the recirculated air from the containment area.

- J. Containment: The process of isolating a contaminated area from the rest of the facility. Depending on the work to be done and the equipment required, airlocks, pass throughs, and equipment rooms may be necessary. Full containment always requires that negative pressure be maintained inside the containment area.
  - 1. Containment Requiring Activities include, but are not limited to the following:
    - a. Demolition and removal of walls, floors, ceilings and other building finish materials.
    - b. Demolition of plumbing, mechanical and electrical systems and equipment.
    - c. Finish operations such as sanding, painting and application of special surface coatings.
    - d. All routine construction activity that can generate dust.
    - e. Sitework operations.
  - 2. Source containment can also be used with localized negative pressure if a very small area is involved. A small piece of plastic sheet can be taped around the area to be removed. A small HEPA vacuum is used for this purpose by inserting the inlet nozzle inside this small containment to create a negative pressure and to vacuum up released particles.
- K. Containment Area: The construction activity area, adjacent staging and storage areas, passages for construction personnel to access the project site and delivery and removal of supplies and waste. It includes the entire volume of the project area including ceilings spaces above and adjacent to the construction area. Containment areas are determined by the Construction Project Manager, the Hospital's ICRA Committee, and as indicated on the Drawings.
- L. Pressure Differential: The difference in magnitude between a reference pressure and a variable pressure.
- M. Air changes per hour is equal to the air filtered (in cubic feet) in one hour divided by the containment area size (in cubic feet), or
$$\text{Air Changes per Hour (AC/H)} = \frac{\text{Cubic Feet of Air filtered in 1 Hour}}{\text{Containment Area Size in Cubic Feet}}$$
- N. Protection Area: The designated project limits, hospital and clinical areas adjacent to containment area, either occupied or used for passage and areas connected to construction areas by mechanical system intake, exhaust and ductwork. Protection areas are determined by the Construction Project Manager and the Hospital's Infection Control Committee as indicated on the Drawings.
- O. Minor Ceiling Access: Removal of one ceiling or access panels for visual observation in 50'-0", minor adjustments or other activities that do not disturb dust. All acoustical and access panels shall be closed immediately upon leaving the worksite.
- P. Major Ceiling Access: Removal of ceiling panels or systems that is not defined as "minor".
- Q. Thorough Cleaning (Construction Clean): Cleaning of surfaces that become exposed to dust shall be accomplished by the use of either a HEPA-filtered vacuum cleaner or a wet mop.
- R. Terminal Cleaning: Completed by Hospital Environmental Service Staff after construction complete and space turned over for occupancy.
- S. Infection Control Risk Assessment (ICRA): A broad, long-range involvement of a Hospital's infection control/epidemiology leadership and safety staff, to assess the risk to patients and the Hospital environment to airborne contamination.

#### 1.05 POLICY

- A. The intent of this policy is to minimize Hospital Acquired Infections (HAI) in patients that may arise as a result of exposure to organisms released into the environment during construction and renovation activities. Controlling the dispersal of airborne or waterborne infectious agents concealed within building components is critical in all Spectrum facilities.
- B. Patient Care Objectives: All construction and renovation activities shall be defined and managed in such a way that occupants' exposure to dust, moisture and their accompanying

hazards is limited.

1. Aspergillosis and related nosocomial fungal infections are caused through inhalation by immunocompromised patients of aspergillus spores, or other related spores, that can be present in the construction environment. The spores are known to be prolifically present in construction dust, debris and earthwork excavation dust. Outbreaks are associated with unfiltered air, contaminated ventilation systems at intake and exhaust ducts, and dust that is dislodged by renovation and construction. Control of construction dust, debris and excavation dust is imperative to help prevent outbreaks of aspergillosis or related nosocomial fungal infections in immunocompromised patients.
2. Inhalation of aspergillus spores or other fungal spores by immunocompromised patients can lead to serious complications and death.
3. Airborne contaminant control is critical in all areas. Contractor shall limit dissemination of airborne contaminants produced by construction-related activities, in order to provide protection of immunocompromised patients, other patients, staff, diagnostic operations and sensitive procedures and medical equipment from possible undesirable effects of exposure to such contaminants.
4. Dust in ceilings and construction debris contains fungus spores. Construction activities causing disturbance of existing dust, or creating new dust, or other airborne contaminants, must be conducted in tight enclosures cutting off any flow of particles into patient areas.
5. Ceilings and walls in protected areas and other areas within Hospital and clinical area as indicated on Drawings must be secure from airborne transmissions at all times. If access into the ceiling in occupied areas is required, procedures described within this Section shall be followed.
6. Enclosed and wiped clean carts must be used when transporting construction debris and materials throughout the environment. The Construction Project Manager and Hospital ICRA Committee shall approve the transportation path and destination terminus prior to commencing the project.

**1.06 PROCEDURES**

- A. The Owner’s Representative (CPM) in conjunction with the Hospital’s ICRA Committee will:
  1. Determine the infection control project classification using the matrices located below.
  2. Coordinate the relocation of affected patients and pedestrian traffic routes to areas where there is less potential for exposure to airborne contaminants with the responsible departments.
  3. Coordinate the preparation of the project area, including the removal of medical supplies, waste, and equipment, prior to the commencement of project activities with the responsible departments.
- B. Infection Control Risk Assessment (ICRA) Guidelines
  1. STEP 1: Identify the Construction Project Activity Type (Types A-D) by selecting the appropriate construction activity type from the table below. Construction activity type is determined by the amount of dust that is generated, the duration of the activity and the involvement with HVAC systems.

Construction Project Activity by Type (A-D)	
Type A	Inspection and Non-Invasive Activities. Includes, but is not limited to: removal of ceiling tiles for visual inspection only, e.g., limited to 1 tile per 50 square feet painting (but not sanding) Inspection of wallcovering, electrical trim work, minor plumbing, and activities that do not generate dust or require cutting of walls or access to ceilings other than for visual inspection.
Type B	Small scale, short duration activities which create minimal dust Includes, but is not limited to:

	installation of data, telephone and computer cabling access to chase spaces cutting of walls or ceiling where dust migration can be controlled
Type C	Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies Includes, but is not limited to: sanding of walls for painting or wall covering removal of floorcoverings, ceiling tiles and casework new wall construction minor duct work or electrical work above ceilings major cabling activities any activity that cannot be completed within a single workshift.
Type D	Major demolition and construction projects. Includes, but is not limited to: activities which require consecutive work shifts new construction requires heavy demolition or removal of complete cabling system any activity that requires temporary partitions

- C. STEP 2: Identify the Patient Risk Group that will be affected by selecting the appropriate Patient Risk Group from the table below. The Patient Risk Groups defined are based on project location and occupancy. If more than one risk group will be affected, select the higher risk group. For all construction classes, patients must be removed from the room while work is performed.

Patient Risk Group			
Low Risk	Medium Risk	High Risk	Critical Risk
Infrastructure (electrical closets, mechanical rooms) Office areas Public Areas Outpatient Clinics Shell Space	Burn Clinic Cardiology Echocardiography Endoscopy Nuclear Medicine Physical Therapy Radiation Oncology Radiology/CT/MRI Respiratory Therapy Occupational Therapy	Emergency Room Kitchen / Cafeteria Labor & Delivery Laboratories (specimen) Medical and Surgical Units Newborn Nursery Outpatient Surgery Pediatrics Pharmacy Post Anesthesia Care Unit Progressive Care Inpatient Rehab Services Rehab Unit Long Term	Any area caring for immunocompromised patients Burn Unit Cardiac Cath Lab Central Sterile Supply Dialysis Intensive Care Units Interventional Radiology Negative pressure isolation rooms (including Bronchoscopy Suites) Oncology / BMT Operating rooms including C-section rooms Pediatric Sedation Sterile Processing

Patient Risk Group			
Low Risk	Medium Risk	High Risk	Critical Risk
		Care Unit / Skilled Nursing Facility (SNF)	

1. Note: If an area requiring work is located within an area listed as a higher patient risk group it will be treated as if it is the higher patient risk group (e.g. a mechanical closet located within an operating room area.)
- D. STEP 3: Match the Patient Risk Group (Low (L), Medium (M), High (H), Critical Risk (X)) with the Construction Project Type (A, B, C, D) to find the Class of Precautions (I – IV). Using the Construction Activity Type and the Patient Risk Group selected from the tables above, use the infection control matrix below to determine Construction Classification (Class). Construction Classification (Class) determines the procedures to be followed during construction and renovation projects.

Patient Risk Group / Construction Project Type Comparison				
Patient Risk Group	TYPE A	TYPE B	TYPE C	TYPE D
Low Risk Group	I	II	II	III / IV
Medium Risk Group	I	II	III	IV
High Risk Group	I / II	II	III / IV	IV
Critical Risk Group	II	III / IV	III / IV	IV

1. Note: Infection Control approval will be required when the Construction Activity and Risk Level indicate that Class III or Class IV control procedures are necessary.
- E. STEP 4: Description of Required Infection Control Precautions by Class. Implement the appropriate Construction Guideline based on the project classification selected from the Construction Activity matrix above (STEP 3). Construction Classification (Class) Guidelines are procedures to control release(s) of airborne contaminants resulting from construction, demolition, or renovation activities.

Description of Required Infection Control Precautions by Class		
During Project Construction		Upon Project Completion
Class I	<ol style="list-style-type: none"> <li>1. Execute work by methods to minimize raising dust from construction operations.</li> <li>2. Immediately replace a ceiling tile displaced for visual inspection.</li> <li>3. If more than once ceiling tile is removed for inspection in a non-critical area, a containment unit must be used.</li> <li>4. No particulate testing required.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean work area upon completion of task.</li> </ol>
Class II	<ol style="list-style-type: none"> <li>1. Provide active means to</li> </ol>	<ol style="list-style-type: none"> <li>1. Wipe work surfaces with</li> </ol>

	<p>prevent airborne dust from dispersing into atmosphere.</p> <p>2. Water mist work surfaces to control dust while cutting.</p> <p>3. Seal unused doors with duct tape.</p> <p>4. Block off and seal air vents with filter media.</p> <p>5. Place dust mat at entrance and exit of work area</p> <p>6. Remove or isolate HVAC system in areas where work is being performed. 7. No particulate testing required.</p>	<p>cleaner/disinfectant.</p> <p>2. Contain construction waste before transport in tightly covered containers.</p> <p>3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 4. Remove isolation of HVAC systems in areas where work is being performed.</p>
Class III	<p>1. Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system. Block supply vents and filter return ducts.</p> <p>2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.</p> <p>3. Document and Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.</p> <p>4. Contain construction waste before transport in tightly covered containers. 5. Cover transport receptacles or carts. Tape covering unless solid lid.</p> <p>6. Minimum particulate testing required is baseline, midway, and at end of project.</p>	<p>1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Prevention &amp; Control Department and thoroughly cleaned by the owner's Environmental Services Department.</p> <p>2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.</p> <p>3. Vacuum work area with HEPA filtered vacuums.</p> <p>4. Wet mop area with cleaner /disinfectant.</p> <p>5. Remove isolation of HVAC systems in areas where work is being performed.</p> <p>6. Conduct final particulate testing</p>
Class IV	<p>1. Isolate HVAC system in area where work is being done to prevent contamination of duct system.</p> <p>2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area</p>	<p>1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Prevention &amp; Control Department and thoroughly cleaned by the owner's Environmental Services Dept.</p>

	<p>or implement control cube method (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.</p> <p>3. Document and Maintain negative air pressure within work site utilizing HEPA equipped air filtration units.</p> <p>4. Seal holes, pipes, conduits, and punctures appropriately.</p> <p>5. Construct anteroom and require all personnel to pass through this room so they can be vacuumed using a HEPA vacuum cleaner before leaving work site or they can wear cloth or paper coveralls that are removed each time they leave work site.</p> <p>6. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.</p> <p>7. Minimum particulate testing required is baseline, midway, and at end of project.</p>	<p>2. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction.</p> <p>3. Contain construction waste before transport in tightly covered containers.</p> <p>4. Cover transport receptacles or carts. Tape covering unless solid lid.</p> <p>5. Vacuum work area with HEPA filtered vacuums.</p> <p>6. Wet mop area with cleaner /disinfectant.</p> <p>7. Remove isolation of HVAC systems in areas where work is being performed.</p> <p>8. Conduct final particulate testing</p>
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**1.07 PERFORMANCE REQUIREMENTS**

- A. Owner’s Representative (CPM) Responsibilities:
  - 1. Determine that the Containment and Protection Areas are properly defined and adequately enclosed by the Contractor.
  - 2. Issue a Statement of Requirements in both graphic and written form to communicate the above, based upon an evaluation of the construction area and the impact of the project on patient care.
  - 3. Approve all enclosures constructed by the Contractor.
- B. Owner’s Responsibilities:
  - 1. Assist Owner’s Representative to determine the Containment and Protection Areas.
  - 2. Coordinate access to Infection Prevention.
- C. Contractor’s Responsibilities:
  - 1. Comply with applicable codes and referenced controls using installation procedures and methods that satisfy code requirements and referenced infection control procedures.
  - 2. Determine specific means and methods of achieving and maintaining control of airborne contaminants during construction.
  - 3. Propose work plan and procedures for control of airborne contaminants.
  - 4. Submit Contractor’s work plan for control of contamination for review in advance of performing any construction activities. Follow procedures established for product shop drawing submittals.

- a. Owner's Representative and Architect shall review work Plan Submittal for general compliance.
  - b. Contractor shall possess a signed copy of the reviewed submittal prior to proceeding with the work.
5. Conform to notification requirements in Quality Assurance Article.
  6. Provide and maintain all dustproof enclosures, measurement devices, warning signs and warning lighting to protect the patients, Hospital and clinical areas, staff and public. Contractor shall remain responsible for compliance with all contamination control requirements.
  7. Verify that all construction personnel have reviewed infection control procedures by using sign-in method. Provide a copy of attendees.

**1.08 PRECONSTRUCTION CONFERENCE**

- A. Pre-Construction Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to Infection Control Risk Assessment (ICRA) including, but not limited to, the following:
  1. Identify Infection Control Risk Assessment.
  2. Review infection control policy.
  3. Review infection control procedures.
- B. Attendees shall include the Owner's Representative, the Hospital's Infection Control Coordinator, the Architect, the Construction Manager, the Contractor the major Subcontractors, and any other parties involved with the project.

**1.09 SUBMITTALS**

- A. Progress Schedule: Submit work and procedure schedules for temporary containment construction. Incorporate infection control milestones within the master project schedule.
- B. Work Plan: Submit drawings and construction details of temporary barriers, descriptions of procedures to be used to achieve and maintain control of construction- related airborne contaminants.
- C. Product Data: Include standard specifications, material descriptions, furnished specialties and accessories, rated capacities and capabilities of individual components for achieving containment.
- D. Special Reports:
  1. Provide written report of Infection Control procedures, including locations, exit routes, details of dust barriers, and means of creating negative pressure prior to commencing the project.
  2. Provide written report confirming specified air velocity whenever enclosure is erected or modified in designated Protection Area.
- E. All reports, work plans, and other supporting documentation should be submitted and reviewed by Hospital ICRA staff.

**1.10 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: An independent agency qualified for testing indicated.
- B. Testing: Owner will engage a qualified independent testing agency to test air quality and pressure for compliance with specified requirements for performance and test methods.

**PART 2 - PRODUCTS**

**2.01 PRODUCTS, GENERAL**

- A. Provide products and materials that comply with stated requirements for each type of products or materials specified.
- B. Products identified below are recommended as appropriate to the task at hand. Other manufacturers than those listed may be submitted for approval, but it is the Contractor's responsibility to provide effective documentation that adequately supports a substitute product or material.



## 2.02 INFECTION CONTROL PRODUCTS

- A. Adhesive-Faced Contamination Control Mats: Sanitary walk-off mat consisting of multi-layered, disposable, 2 mil, non-allergenic, non-odorous, polyethylene sheets with non-drying solid adhesive and anti-microbial germicide. Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. American Floor Mats; Clean Room Sticky Mats
  - 2. Controlled Environment Equipment Corporation; Cleanline® Medical Mats.
  - 3. Liberty Industries, Inc.; Tacky Mat® 800030
  - 4. Stickymat USA; Tacky Mat.
  - 5. Texwipe; CleanStep® Adhesive Contamination Control Mats
- B. Modular Temporary Enclosure Panels: Aluminum framed and faced height adjustable panels and accessories to create complete barriers for construction projects.
  - 1. "STARC Systems" [www.stratcsystems.com](http://www.stratcsystems.com)
- C. Portable Enclosures: Construct a temporary enclosure whenever work is performed outside of the containment area. Provide an enclosure of polyethylene sheet described below, enclosing ladder and sealing off opening at the ceiling system, or provide a prefabricated enclosure unit.
  - 1. Portable Pre-Fabricated Environmental Enclosure: A temporary enclosure for work in sterile or patient environment outside of the Containment Area. A heavy-duty vinyl enclosure and adjustable, spring-loaded top frame to accommodate variabilities in ceiling height; provide ceiling mechanism for snug fit that will not damage ceiling panels. Furnish with inspection window, pressure differential porthole for a HEPA-filtered vacuum device capable of 300-800 CFM and manometer.
    - a. Clean Work Booth, Inc. [www.cleanworkbooth.com](http://www.cleanworkbooth.com) (This is the standard unit Spectrum uses)
    - b. Fiberlock Technologies, Inc.; Kontrol Kube®.
    - c. Mintie Technologies, Inc.; ECU Ceiling Cavity™.
    - d. ZipWall LLC; Zipwall®.
- D. Polyethylene Sheet: Provide 6 mil, internally reinforced polyethylene laminate, fire- retardant sheet, NFPA-approved, sealed with fire-retardant tape at joints and penetrations above the ceiling.
  - 1. Reef Industries, Inc.; Griffolyn® Type 55 FR.
  - 2. Raven Industries; DURA-SKRIM® 2FR or 10FR.

## 2.03 ACCESSORIES

- A. Protective Clothing: The Owner will provide disposable paper jumpsuits or reusable, fabric coveralls, head, and shoe coverings for use by construction personnel outside or inside of the Containment Area.
- B. Respiratory Gear: Provide respiratory gear as required by OSHA regulation 29 CFR 1926 (Construction Safety Regulations).

## 2.04 EQUIPMENT

- A. Portable Air Scrubbers and Negative Air Machines:
  - 1. Product[s]: Multi-filtered, including 99.9% efficient HEPA filter, variable-speed motor, static pressure-monitored, equipped with electrical or mechanical lockout to prevent fan from operating without a HEPA filter, powered mechanical equipment utilized to create a dust-free environment. Subject to compliance with infection control requirements, provide one of the following:
    - a. Abatement Technologies, Inc.; HEPA-AIRE® Portable Air Scrubber.
    - b. Micro-Trap Inc.; Micro Trap™ 2000 Negative Air Filtration Unit.
    - c. Mintie Technologies, Inc.; 2000V Negative Air Machine.
    - d. Omnitec Design, Inc.; Omniaire OA2000V HEPA Negative Air Machine.
- B. Hospital may provide the HEPA-filtered vacuum for Contractor use during the project.
- C. HEPA-Filtered Vacuum Machine:

1. Product[s]: Multi-stage, 99.9% efficient HEPA filtration system, grounded, interference suppressed, 110/120V or 220/240V motor, minimum 10-gallon, minimum 500-1000 CFM capacity, powered mechanical equipment utilized to negatively pressurize small temporary dust enclosures to create a dust-free environment or in use to clean surfaces or construction personnel. Subject to compliance with infection control requirements, provide one of the following:
  2. Festool; CT Dust Extractor, Cleantex CT 48 HEPA (12.7 gal).
  3. Nikro Industries, Inc.; HEPA Vacuum (Dry), Model PD15110 (15 gal).
  4. Dustless® Technologies; Dustless HEPA Vacuum (16-gal).
- D. Air Pressure Monitor:
  1. Product[s]: Differential switch/gauge to monitor differential pressure between the containment area and the protection area. Diaphragm type with dial and pointer in metal case, vent valves, black figures on white background and front recalibration adjustment with a range of plus/minus 0- to .50-inches water gauge and high-low adjustable set points. Subject to compliance with infection control requirements, provide a product comparable to the following:
    - a. Abatement Technologies, Inc.; HEPA-CARE®
    - b. Dwyer Instruments, Inc.; Model #3000MR-0.
    - c. OMEGA; DPG300
  2. Install the differential pressure switch/gauge in a NEMA-rated enclosure. Provide all necessary power wiring, transformers and relays to operate the system. Provide a switch that will enable activation of audio, visual, or both alarms that activates upon sensing pressure differences beyond the range set points. Provide a manual reset gauge after an alarm condition.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine containment area and protection area, with Owner Representative (CPM) and Infection present, for compliance with Infection Control requirements.
  1. For the record, prepare written report, endorsed by Owner Representative, listing conditions detrimental to Infection Control performance.
  2. Proceed with installation only after unsatisfactory conditions have been corrected.
    - a. Notify the Owner's Representative according to time line requirements identified previously before commencing work.

### **3.02 MONITORING**

- A. Before commencing any demolition or construction in occupied areas, a complete review of all airborne contaminant control policies shall be conducted. A checklist shall be completed and signed by the Construction Project Manager, Infection Preventionist and the Contractor, confirming that the area is ready for work to begin.
- B. Owner will monitor conditions in the vicinity of project in Protection Areas. Such areas are identified by the Owner's Representative and as indicated on drawings. Whenever unsafe conditions are observed, Contractor will be notified to correct conditions immediately to avoid work stoppage.
  1. All work shall be stopped immediately whenever a hazardous containment control deficiency exists on the project.
  2. The Contractor shall take immediate action to correct all deficiencies.

### **3.03 PROTECTION**

- A. Contractor shall install dust proof enclosures for work as directed above, as directed by the Owner's Representative, as indicated on the Drawings and when required to protect areas occupied by the Owner from dust, debris, and damage.
- B. Provide a temporary work surface to provide a safe working platform and protect the ceiling and the spaces below from falling objects and materials. Construction must be conducted in tight enclosures cutting off any flow of dust particles into patient areas.

1. Airborne contaminant control requirements: Floor to structure, airtight enclosures, drywall barriers, using tape and foam padding to seal all joints and penetrations.
  2. Keep enclosure door closed at all times.
  3. Traffic between Containment Area and open areas shall be kept to a minimum.
  4. Transport materials and refuse into an area from an external site without violating patient care areas by transporting in covered containers.
  5. Provide negative pressure in construction area.
  6. Provide adequate forced ventilation of enclosed areas to cure installed materials, to prevent excessive humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
  7. Ductwork Dust Caps: Block off all existing ventilation ducts within the construction area. Method of capping ducts shall be dust-tight and withstand airflow pressures.
- C. Dust Proof Enclosures:
1. Full height, noncombustible construction with minimum 5/8" fire-rated gypsum board both sides with 3-1/2 inch R-11 insulation batts to reduce noise UL Approved design for any 1-hour rated enclosure if required by authorities with jurisdiction. Use tape to tightly seal top, bottom, penetrations and seams, to prevent spread of dust to occupied areas, including above ceiling. Secure all tape with spray adhesive. Dust proof enclosures adjacent to or in public areas shall be taped and painted on the side exposed to public view.
  2. Enclosure Doors: 4'-0" minimum width, unless shown otherwise, solid core wood with metal frame and hardware, closer and tightly weatherstripped to prevent flow of dust. Locate as indicated on drawing and swing out of the construction area. Keep enclosures locked outside of working hours. Coordinate with the Owner for access.
  3. Install disposable, multi-layered tacky floor mats on both sides of construction entrance prior to commencing demolition or construction. Remove old tacky surface as needed to prevent tracking, daily as minimum.
  4. Obtain Owner's approval of exact location and details of enclosure construction.
  5. Materials for enclosure shall be precut in unoccupied areas before delivering to project site. No explosive or pneumatic drive fasteners permitted, unless authorized by Owner.
  6. Provide entrance vestibules (antechambers) as described. Provide all floor mats inside vestibule. Sticky mat should be adjacent to door, with dry mat and then wet mat as you proceed into construction area.
- D. Enclosure outside of work area (including spaces above ceilings): Whenever work is necessary outside of the construction enclosures (containment area), the space where work is being done, including ladders, shall be contained within a full-height portable enclosure. At Contractor's option, a prefabricated unit may be used.
1. All work performed outside the construction enclosure shown on drawings, including all work in corridors and lobbies shall be performed outside of normal working hours and shall be scheduled in advance with Owner, except where specified otherwise.
  2. At no time shall any construction equipment or material be stored outside the construction enclosure.
  3. Any dust tracked outside of construction area shall be cleaned up immediately. Contractor shall have the necessary personnel and equipment (HEPA-filtered vacuum, dust and wet mops, brooms, and clean wiping cloths) to keep adjacent occupied areas clean at all times.
- E. Power and Lighting: Provide sufficient temporary lighting and power ventilating equipment to ensure proper workmanship and safety.
- F. Access Provisions: Provide ramps, stairs, ladders and similar temporary access elements as reasonably required to perform the work and facilitate its inspection during installation.
- G. Airborne dust generation of significant quantities of dust will not be tolerated. Clean the work area prior to starting work to minimize existing dust becoming airborne during construction. Provide drop cloths and dust partitions as necessary to contain dust and debris generated by the work.

- H. Demolition material, dust and dirt shall be removed in covered, tightly sealed, rubber tired, polyethylene dump carts. Containers shall be fitted with clean polyethylene covers, completely sealed at perimeter by wire tying or taping. Before leaving area, all containers shall be wiped clean with biocide to prevent tracking of dust. Provide debris chutes if required.
- I. If work is being performed above an accessible ceiling and if work must be performed while the space below is occupied, spray top of ceiling panels to be removed and surrounding affected panels, with fine detergent/water mist to settle dust prior to removal.
- J. A portable plastic fabric tunnel or a polyethylene enclosure for larger openings shall be used for each single ceiling access outside of the Containment Area. The enclosure's opening shall have a 3-foot overlap of polyethylene to decrease risk of airborne dust. The portable plastic fabric tunnel, or portable enclosure, shall remain in place until the ceiling is secured (all accesses closed). In patient care areas, the apparatus (tunnel or enclosure) shall be dismantled and access panels replaced or remodeling of access completed at the end of each day.
- K. If the contractor needs to crawl about pipes, ducts, or other building infrastructure to investigate a condition, the Contractor shall use additional procedures, (e.g. put on a mask, disposable coverall and disposable shoe covers) before going into the access. The surfaces that will be disturbed shall be vacuumed with a HEPA-filtered vacuum before proceeding. Afterwards the contractor shall strip off the coverall, and shoe covers carefully, turning the coverall "inside-out" and deposit the mask, coverall, and shoe covers into a plastic trash bag inside the enclosure. This plastic trash bag shall be secured (tied off) and discarded as directed by Owner's Representative and may not be discarded within any patient care area.
- L. Exercise caution when handling fluids, or piping systems, in the space above ceilings and other Hospital or clinical operations. When working with fluids, provide a watertight barrier beneath the work area to catch and retain all spillage before it reaches the ceiling below.
- M. Water leaks must be cleaned up and repaired as soon as possible, but within 48 hours to prevent mold proliferation in floor and wall coverings, ceiling panels and cabinetry in patient care areas. If cleanup and repair are delayed more than 48 hours after the water leak, the involved materials must be assumed to contain fungi and handled accordingly. Use of a moisture meter to detect water penetration of walls should be used whenever possible to guide decision-making. Moisture meter testing to be performed by Owner. If the wall or other component does not have less than 20% moisture content more than 48 hours after water penetration, it shall be removed.
- N. Contractor is responsible for determining when a dust proof enclosure is required to protect any adjoining area; however, the Contractor shall provide a dust proof enclosure where indicated and whenever requested by the Owner's Representative. Take all necessary precautions to protect the people and spaces below from injury or damage due to Contractor's operations.
- O. Notify department manager so that patient room doors near ceiling work will be kept closed while the work is in progress.

### 3.04 CONTAINMENT AREA

- A. Maintain levels of airborne contaminants within Containment Area and Protective Area limits as defined by the Owner's Representative and Infection Control Risk Manager.
- B. Portable Air Scrubbers and Negative air machines shall remove airflow from construction area at not less than 100 FPM at enclosure entrances with all doors fully open. As an alternative, provide adequate exhaust air volume to provide 6 air changes per hour.
- C. Dust Control: The Contractor shall take appropriate steps throughout the term of the Project to prevent airborne dust due to work under this contract. Water shall be applied wherever practical to settle and hold dust to a minimum, particularly during demolition and moving of materials. Care must be taken to prevent the accumulation of standing water or the saturation of any materials. No chemical palliatives shall be used without permission of the Owner's Representative.
  - 1. Spray surfaces with water during dust-producing interior demolition activities. Hard surface floors in work area, adjacent hallways and passage areas require vacuuming with HEPA-

- filtered vacuum cleaners and frequent wet-mopping during demolition and construction; protect adjacent carpeted areas with plastic and plywood and vacuum with HEPA-filtered vacuum cleaners.
  - 2. Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent airborne dust from dispersing into atmosphere.
  - 3. Any dust tracked outside enclosure shall be removed immediately, using HEPA-filtered vacuum.
  - 4. All cleaning outside enclosure shall be by HEPA-filtered vacuum or other approved method.
- D. The following procedure shall be implemented when construction personnel are required to pass through a Protected Area to enter the Containment Area:
- 1. Provide airlock entry vestibules to dustproof enclosures when shown on Drawings or required by Owner's Representative.
  - 2. Construction personnel shall wear protective clothing when passing through the Protective Area or when directed by the Owner's Representative. The protective clothing shall be removed in the airlock vestibule prior to entering the Containment Area and stored for reuse.
    - a. When exiting the Containment Area the protective clothing shall again be worn when passing through the Protective Area.
- E. Construction Personnel: Instruct personnel to refrain from tracking dust into adjacent Hospital or clinical areas or opening windows or doors allowing airborne contaminants into the adjacent Hospital or clinical areas.
- F. Exterior Work: Direct exhaust from equipment away from building air intakes, maintain minimum distance equal to 25'-0"; assure that filters on building air intakes are operational and protected from excessive amounts of airborne contaminants.
- G. Any ceiling panels opened for investigation beyond sealed areas shall be replaced immediately when unattended or covered with an appropriate temporary barrier.
- H. Removal of construction barriers and ceiling protection shall be done carefully.

### **3.05 EQUIPMENT**

- A. Connect portable air scrubbers and negative air machines to emergency power and run continuously.

### **3.06 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing and inspecting of completed phases of the work shall take place in successive stages, in areas of extent and using methods described in Quality Assurance article. Do not proceed with removal or construction of each enclosure for the next area until test results for previously completed phases of the work show compliance with requirements. Owner's Representative is satisfied that work is completed and clean up procedure has been performed.
- C. Repair or replace construction enclosures where test results indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of repaired or replaced work with specified requirements.

### **3.07 CLEANING**

- A. Provide thorough cleaning of all surfaces that become exposed to dust each day. Thoroughly clean each temporary access when work is completed or at the end of each work shift, using approved methods.
- B. Provide a final thorough construction cleaning of area before turning space over to Owner for final cleaning.
- C. Final cleaning of construction (to medically clean standards) shall be performed by the Owner's own housekeeping forces.

**3.08 ENFORCEMENT**

- A. Failure to maintain containment areas will result in issuance of a written warning. If the situation is not corrected within (8) eight hours of receipt of warning, Owner will have cause to stop the work as provided in the General Conditions.
  - 1. Failure of Contractor to correct deficiencies in containment will result in corrective action taken by Owner and all costs deducted from the Contractor.
- B. The Owner's Representative will perform periodic inspections to determine compliance with infection control procedures. Written documentation shall be filed as part of the project documentation. Photographs may be taken to document work site conditions.

**END OF SECTION 013533**

	01 3533 - 14	INFECTION CONTROL PROCEDURES
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