

Construction Risk Assessment



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Statistics to Consider

- Hospital acquired infections
 - Over 100,000 deaths per year
 - Majority are failure to comply with existing protocols and procedures
 - Hand washing by clinical/support staff
 - **Estimate 5% are related to environmental conditions, construction, and maintenance**
 - Costs for treating nosocomial infections is approximately \$5 billion a year

Construction Risk Assessment

Objectives

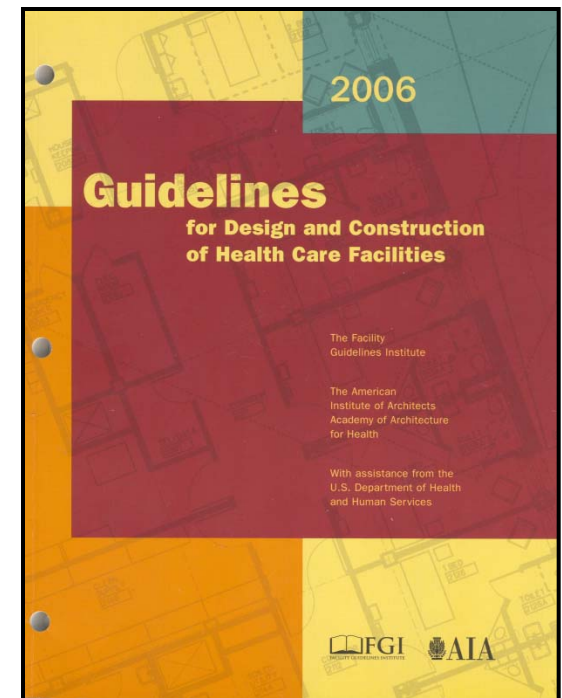
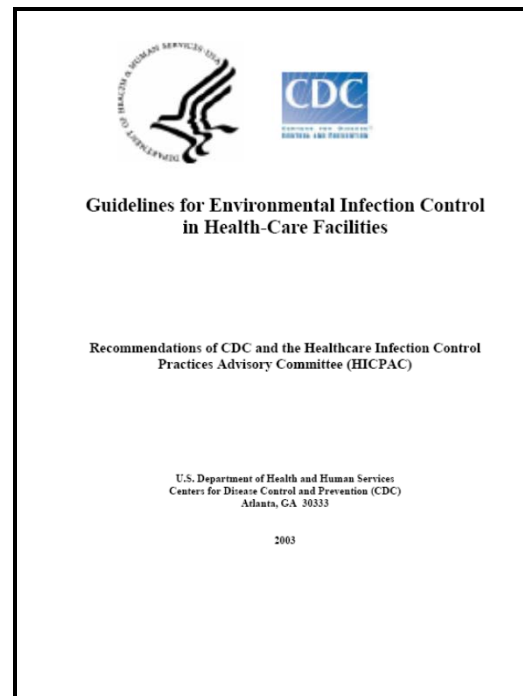
1. Define Construction Risk Assessment
2. Discuss Regulations & Recommendations
3. Use an Infection Control Risk Assessment tool to determine appropriate precautions.
4. Discuss features of an effective dust barrier
5. Test our Skills

What is a Constructing Risk Assessment?

- Proactive: Before the job begins (JCAHO)
- Involves multidisciplinary team (CDC, AIA)
- Performed by owner (AIA)
- Includes:
 - Infection Control Risk Assessment (JCAHO, CDC, AIA)
 - Noise, vibration, dust, utility requirements, air quality (JCAHO)
 - Life safety & protection of occupants (JCAHO, AIA)
- Addressed in bid documents (AIA)

Why Construction Risk Assessment?

- Patient Safety
- Regulations
- Recommendations



Who Is Responsible for the ICRA?

- Conducting the ICRA: Healthcare organization
- Implementing the ICRMR, (Infection Control Risk Mitigation Recommendations): Healthcare organization and Construction Company

What does CDC say?

*For external and internal demolition, **barriers** are required when:*

- Working with plumbing in sensitive areas
- Exposing ceiling cavity spaces
- Crawling into ceiling spaces
- Working on elevator shafts
- Demolishing wallboard, plaster, ceramic tile, ceiling tile
- Removing flooring
- Removing windows and doors
- Removing casework

Guidelines for environmental infection control in health-care facilities. CDC, 2003.

The Infection Control Risk Assessment Process

A Step-by-Step Process

ICRA (Infectious Control Risk Assessment)

Infection Control Risk Assessment Matrix of Precautions for Construction & Renovation

Step One:

Using the following table, identify the **Type of Construction Project Activity (Type A-D)**

TYPE A	Inspection and Non-Invasive Activities. Includes, but is not limited to: • removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet • painting (but not sanding) • wallcovering, electrical trim work, minor plumbing, and activities which 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 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 which 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 • requires heavy demolition or removal of a complete cabling system • new construction.

STEP 1:

Step Two:

Using the following table, identify the **Patient Risk Groups** that will be affected. If more than one risk group will be affected, select the higher risk group:

Low Risk	Medium Risk	High Risk	Highest Risk
<ul style="list-style-type: none"> Office areas 	<ul style="list-style-type: none"> Cardiology Echocardiography Endoscopy Nuclear Medicine Physical Therapy Radiology/MRI Respiratory Therapy 	<ul style="list-style-type: none"> CCU Emergency Room Labor & Delivery Laboratories (specimen) Newborn Nursery Outpatient Surgery Pediatrics Pharmacy Post Anesthesia Care Unit Surgical Units 	<ul style="list-style-type: none"> Any area caring for immunocompromised patients Burn Unit Cardiac Cath Lab Intensive Care Units Medical Unit Negative pressure isolation rooms Oncology Operating rooms including C-section rooms

Step 2:

Step Three: Match the

Patient Risk Group (Low, Medium, High, Highest) with the planned...
 Construction Project Type (A, B, C, D) on the following matrix, to find the...
 Class of Precautions (I, II, III or IV) or level of infection control activities required.

Class I-IV or Color-Coded Precautions are delineated on the following page.

IC Matrix - Class of Precautions: Construction Project by Patient Risk

Patient Risk Group	Construction Project Type			
	TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	IIIV
MEDIUM Risk Group	I	II	III	IV
HIGH Risk Group	I	II	IIIV	IV
HIGHEST Risk Group	II	IIIV	IIIV	IV

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.

Step 3:

CLASS I	1. Isolate HVAC system in area where work is being done to prevent contamination of duct system. 2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (can with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins. 3. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 4. Seal holes, pipes, conduits, and penetrations appropriately. 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 the work site. 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. 7. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department.	1. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction. 2. Contain construction waste before transport in tightly covered containers. 3. Cover transport receptacles or carts. Tape covering unless solid lid. 4. Vacuum work area with HEPA filtered vacuum. 5. Wet mop area with disinfectant. 6. Remove isolation of HVAC system in areas where work is being performed.
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Step 4. Identify the areas surrounding the project area, assessing potential impact

Unit Below	Unit Above	Lateral	Lateral	Behind	Front
Risk Group	Risk Group	Risk Group	Risk Group	Risk Group	Risk Group

Step 5. Identify specific site of activity eg. patient rooms, medication room, etc.

Step 6. Identify issues related to: ventilation, plumbing, electrical in terms of the occurrence of probable outages.

Step 7. Identify containment measures, using prior assessment. What types of barriers? (Eg. solids wall barriers); Will HEPA filtration be required?

(Note: Restoration construction area shall be isolated from the occupied area during construction and shall be negative with respect to surrounding areas)

Step 8. Consider potential risk of water damage. Is there a risk due to compromising structural integrity? (eg. wall, ceiling, roof)

Step 9. Work hours: Can or will the work be done during non-patient care hours?

Step 10. Do plans allow for adequate number of isolation/negative airflow rooms?

Step 11. Do the plans allow for the required number & type of handwashing sinks?

Step 12. Does the infection control staff agree with the minimum number of sinks for this project? (Verify against AIA Guidelines for types and area)

Step 13. Does the infection control staff agree with the plans relative to clean and soiled utility rooms?

Step 14. Plan to discuss the following containment issues with the project team. Eg. traffic flow, housekeeping, debris removal (how and when)

Appendix: Identify and communicate the responsibility for project monitoring that includes infection control concerns and risks. The ICRA may be modified throughout the project. Revisions must be communicated to the Project Manager.

Description of Required Infection Control Precautions by Class

During Construction Project	Upon Completion of Project
CLASS I 1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace a ceiling tile displaced for visual inspection.	
CLASS II 1. Provide active means to prevent airborne dust from dispersing into atmosphere. 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Place dust mat at entrance and exit of work area. 6. Remove or isolate HVAC system in areas where work is being performed.	1. Wipe work surfaces with disinfectant. 2. Contain construction waste before transport in tightly covered containers. 3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 4. Remove isolation of HVAC system in areas where work is being performed.
CLASS III 1. Remove or isolate HVAC system in area where work is being done to prevent contamination of duct system. 2. Complete all critical barriers i.e. sheetrock, plywood, plastic, to seal area from non work area or implement control cube method (can with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit) before construction begins.	1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department. 2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.

Infection Control Construction Permit									
Permit No:					Permit No:				
Location of Construction:					Project Start Date:				
Project Coordinator:					Estimated Duration:				
Contractor Performing Work:					Permit Expiration Date:				
Supervisor:					Telephone:				
YES	NO	CONSTRUCTION ACTIVITY			YES	NO	INFECTION CONTROL RISK GROUP		
		TYPE A: Inspection, non-invasive activity					GROUP 1: Low Risk		
		TYPE B: Small scale, short duration, moderate to high levels					GROUP 2: Medium Risk		
		TYPE C: Activity generates moderate to high levels of dust, requires demolition or removal of any fixed building components or assemblies					GROUP 3: Medium-High Risk		
		TYPE D: Major demolition and construction activities requiring consecutive work shifts					GROUP 4: Highest Risk		
CLASS I					CLASS II				
1. Execute work by methods to minimize raising dust from construction operations.					1. Provide active means to prevent airborne dust from dispersing into atmosphere.				
2. Immediately replace any ceiling tile displaced for visual inspection.					2. Water mist work surfaces to control dust while cutting.				
3. Seal unused doors with duct tape.					3. Seal unused doors with duct tape.				
4. Block off and seal air vents.					4. Block off and seal air vents.				
5. Wipe surfaces with disinfectant.					5. Wipe surfaces with disinfectant.				
6. Minor Demolition for Remodeling					6. Contain construction waste before transport in tightly covered containers.				
7. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.					7. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area.				
8. Place dust mat at entrance and exit of work area.					8. Place dust mat at entrance and exit of work area.				
9. Remove or isolate HVAC system in areas where work is being performed.					9. Remove or isolate HVAC system in areas where work is being performed.				
10. Complete all critical barriers or implement control cube method before construction begins.					10. Complete all critical barriers or implement control cube method before construction begins.				
11. Maintain negative air pressure within work area until complete project is thoroughly cleaned by Env. Services Dept.					11. Maintain negative air pressure within work area until complete project is thoroughly cleaned by Env. Services Dept.				
12. All personnel entering work area are required to wear shoe covers.					12. All personnel entering work area are required to wear shoe covers.				
13. Do not remove barriers from work area until completed project is thoroughly cleaned by the Environmental Services Dept.					13. Do not remove barriers from work area until completed project is thoroughly cleaned by the Environmental Services Dept.				
14. Vacuum work area with HEPA filtered vacuum.					14. Vacuum work area with HEPA filtered vacuum.				
15. Wet mop with disinfectant.					15. Wet mop with disinfectant.				
16. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.					16. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.				
17. Contain construction waste before transport in tightly covered containers.					17. Contain construction waste before transport in tightly covered containers.				
18. Cover transport receptacles or carts. Tape covering.					18. Cover transport receptacles or carts. Tape covering.				
19. Remove or isolate HVAC system in areas where work is being done.					19. Remove or isolate HVAC system in areas where work is being done.				
Additional Requirements:									
Date Issued: _____ Date: _____									
Permit Request By: _____ Date: _____									
Permit Authorized By: _____ Date: _____									

Step 1. Identify the **Type of Construction Project**

TYPE A	<p><u>Inspection and Non-Dust Generating Activities.</u></p> <p>Includes, but is not limited to:</p> <ul style="list-style-type: none"> •removal of ceiling tiles for visual inspection limited to 1 tile per 50 square feet •painting (but not sanding) •wall covering, electrical trim work, minor plumbing, and activities which do not generate dust or require cutting of walls or access to ceilings other than for visual inspection
TYPE B	<p><u>Small Scale, Short Duration Activities which Create Minimal Dust</u></p> <p>Includes, but is not limited to:</p> <ul style="list-style-type: none"> •installation of telephone and computer cabling •access to chase spaces •cutting of walls or ceiling where dust migration can be controlled
TYPE C	<p><u>Work that generates a moderate to high level of dust or requires demolition or removal of any fixed building components or assemblies</u></p> <p>Includes, but is not limited to:</p> <ul style="list-style-type: none"> •sanding of walls for painting or wall covering •removal of floor coverings, ceiling tiles and casework •new wall construction •minor duct work or electrical work above ceilings •major cabling activities •any activity which cannot be completed within a single work shift
TYPE D	<p><u>Major demolition and construction projects</u></p> <p>Includes, but is not limited to:</p> <ul style="list-style-type: none"> •activities which require consecutive work shifts •requires heavy demolition or removal of a complete cabling system •new construction

Step 2. Identify the Patient Risk Groups that will be affected. *(If more than one risk group will be affected, select the higher risk group).*

Low Risk	Medium Risk Most outpatient areas	High Risk Special procedure Surgery recovery Newborns Bed-ridden patients	Highest Risk Immune-suppressed Open wound Transplant units Intensive care units
<ul style="list-style-type: none"> • Office areas • Clinics 	<ul style="list-style-type: none"> • Cardiology • Echocardiography • Endoscopy • Nuclear Medicine • Physical Therapy • Radiology/MRI • Respiratory Therapy 	<ul style="list-style-type: none"> • Emergency Room • Labor & Delivery • Laboratories (specimen) • Newborn Nursery • Outpatient Surgery • Pediatrics • Pharmacy • Post Anesthesia Care Unit • Surgical Units 	<ul style="list-style-type: none"> • Any area caring for immunocompromised patients • Burn Unit • Cardiac Cath Lab • Central Sterile Supply • Intensive Care Units • Medical Units • Negative pressure isolation rooms • Oncology • Operating rooms

Step 3. Use the matrix below to match the Patient Risk Group and Type of Construction and determine the Class of Precautions required during construction

	Type of Construction			
Patient Risk Group	TYPE A	TYPE B	TYPE C	TYPE D
LOW Risk Group	I	II	II	III / IV
MEDIIUM Risk Group	I	II	III	IV
HIGH Risk Group	I	II	III / IV	IV
HIGHEST Risk Group	II	III / IV	III / IV	IV

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.

Step 3. Use the matrix to match the Patient Risk Group and Type of Construction and determine the Class of Precautions required

	Type of Construction			
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	III / IV	IV
HIGHEST Risk Group	II	III / IV	III / IV	IV

Class of Precautions

Description of Required Infection Control Precautions by **Class**

	During Construction Project	Upon Project Completion
CLASS I	<ol style="list-style-type: none">1. Execute work by methods to minimize raising dust from construction operations.2. Immediately replace a ceiling tile displaced for visual inspection	Environmental cleaning

	Type of Construction			
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	III / IV	IV
HIGHEST Risk Group	II	III / IV	III / IV	IV

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.

Description of Required Infection Control Precautions by **Class**

	During Construction Project	Upon Project Completion
CLASS II	<ol style="list-style-type: none"> 1. Provide active means to prevent airborne dust from dispersing into atmosphere. 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Place dust mat at entrance and exit of work area 6. Remove or isolate HVAC system in areas where work is being performed. 7. Zip Wall containment w/ HEPA Jet Filter 	<ol style="list-style-type: none"> 1. Wipe work surfaces with disinfectant. 2. Contain construction waste before transport in tightly covered containers. 3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 4. Remove isolation of HVAC system in areas where work is being performed.

Step 3. Use the matrix below to match the **Patient Risk Group and **Type of Construction** and determine the **Class of Precautions** required during construction**

	Type of Construction			
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	III / IV	IV
HIGHEST Risk Group	II	III / IV	III / IV	IV

Class of Precautions

During Construction Project

CLASS III

1. Remove or isolate HVAC system in work area to prevent contamination of duct system.
2. Before construction begins: Complete all critical barriers (e.g., sheetrock, plywood, plastic) to seal work area from non work area. For small areas, use control cube (cart with plastic covering and sealed connection to work site with HEPA vacuum for vacuuming prior to exit)
3. Maintain negative air pressure within work area using HEPA equipped air filtration units.
4. Cover all transport receptacles or carts—including waste containers. Tape covering unless solid lid.

Upon Completion

CLASS III

1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department.
2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.
3. Vacuum work area with HEPA filtered vacuums.
4. Wet mop area with disinfectant.
5. Remove isolation of HVAC system in areas where work is being performed.

	Type of Construction			
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	III / IV	IV
HIGHEST Risk Group	II	III / IV	III / IV	IV

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.

During Construction Project

CLASS IV

1. All Class III precautions *PLUS*:
2. Construct anteroom. 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 the work site.
3. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.
4. Seal holes, pipes, conduits, and punctures appropriately.

Upon Completion

CLASS IV

1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department.
2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction.
3. Vacuum work area with HEPA filtered vacuums.
4. Wet mop area with disinfectant.
5. Remove isolation of HVAC system in areas where work is being performed.

Determine the Level of Protection

Examples

- Construction **TYPE A** in **LOW RISK** patient group:
 - Does not require barriers or negative pressure.
 - “Just get in and get it done”.
- Construction **TYPE B** in **MEDIUM RISK** patient group:
 - Provide active means for preventing dispersal of dust
- Construction **TYPE A-D** in **HIGH/HIGHEST RISK** patient group:
 - Barriers, HEPA filtered vacuums, negative air pressure

Other Steps...

Step 4. Identify the areas surrounding the project area, assessing potential impact.

Unit Below	Unit Above	Lateral	Lateral	Behind	Front
Risk Group	Risk Group	Risk Group	Risk Group	Risk Group	Risk Group

Step 5. Identify specific site of activity, e.g., patient rooms, medication room, etc.

Step 6. Identify issues related to: ventilation, plumbing, electrical in terms of the occurrence of probable outages.

Step 7. Identify containment measures, using prior assessment. What types of barriers, e.g., solid wall barriers? Will HEPA filtration be required?

(Note: Renovation/construction area shall be isolated from the occupied areas during construction and shall be negative with respect to surrounding areas)

Step 8. Consider potential risk of water damage. Is there a risk due to compromising, structural integrity, e.g., wall, ceiling, roof?

Step 9. Work hours: Can or will the work be done during non-patient care hours?

Step 10. Plan to discuss containment issues with the project team, e.g., traffic flow, housekeeping, debris removal (how and when).

Step 11. Discuss who will do daily monitoring of construction area

Infection Control Construction Permit					
			Permit No.		
Location of Construction			Project Start Date		
Project Coordinator			Estimated Duration		
Contractor Performing Work			Permit Expiration Date		
Supervisor			Telephone		
YES	NO	CONSTRUCTION ACTIVITY	YES	NO	INFECTION CONTROL RISK GROUP
		TYPE A: Inspection, non-invasive activity			GROUP 1: Low Risk
		TYPE B: Small scale, short duration, moderate to high levels			GROUP 2: Medium Risk
		TYPE C: Activity generates moderate to high levels of dust, requires greater than 1 work shift for completion			GROUP 3: Medium/High Risk
		TYPE D: Major duration and construction activities requiring consecutive work shifts			GROUP 4: Highest Risk
CLASS I		1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace any ceiling tile displaced for visual inspection.		3. Minor demolition for remodeling	
CLASS II		1. Provides active means to prevent air-borne dust from dispersing into atmosphere 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Wipe surfaces with disinfectant.		6. Contain construction waste before transport in tightly covered containers. 7. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 8. Place dust mat at entrance and exit of work area. 9. Remove or isolate HVAC system in areas where work is being performed.	
CLASS III		1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 3. Complete all critical barriers or implement control cube method before construction begins.		6. Vacuum work with HEPA filtered vacuums. 7. Wet mop with disinfectant 8. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 9. Contain construction waste before transport in tightly covered containers.	
Date		4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 5. Do not remove barriers from work area until complete project is thoroughly cleaned by Env. Services Dept.		10. Cover transport receptacles or carts. Tape covering.	
Initial				11. Remove or isolate HVAC system in areas where work is being performed/	
CLASS IV		1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of duct system. 3. Complete all critical barriers or implement control cube method before construction begins.		7. All personnel entering work site are required to wear shoe covers 8. Do not remove barriers from work area until completed project is thoroughly cleaned by the Environmental Service Dept. 9. Vacuum work area with HEPA filtered vacuums.	
Date		4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 5. Seal holes, pipes, conduits, and punctures appropriately.		10. Wet mop with disinfectant.	
Initial				11. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 12. Contain construction waste before transport in tightly covered containers. 13. Cover transport receptacles or carts. Tape covering. 14. Remove or isolate HVAC system in areas where is being done.	
Additional Requirements (Additions to this permit are noted by attached memoranda)					
Date		Initials		Date	
Permit Request By				Permit Authorized By	
Date				Date	

Implementing ICRA Precautions

Review: Class I & II Precautions

	During Construction Project	Upon Completion of Project
CLASS I	<ol style="list-style-type: none"> 1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace a ceiling tile displaced for visual inspection 	
CLASS II	<ol style="list-style-type: none"> 1. Provide active means to prevent airborne dust from dispersing into atmosphere. 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Place dust mat at entrance and exit of work area 6. Remove or isolate HVAC system in areas where work is being performed. 7. Zip Wall containment w/ HEPA Jet Filter 	<ol style="list-style-type: none"> 1. Wipe work surfaces with disinfectant. 2. Contain construction waste before transport in tightly covered containers. 3. Wet mop and/or vacuum with HEPA filtered vacuum before leaving work area. 4. Remove isolation of HVAC system in areas where work is being performed.

Temporary Construction Enclosures

- Good for smaller construction projects and maintenance tasks, such as replacing ceiling tiles or replacing fluorescent lamps.
- Abatement offers two, cost-effective temporary construction enclosures for applications where it is not practical to build a rigid barrier around the work zone

ZipWall® Temporary Construction Barrier

ZipWall is a versatile, easy-to-use protective barrier system that protects your facility from harmful dust and airborne particles. The ZipWall system goes up easily in minutes without the need for special tools. Telescopic, twist-lock ZipWall Poles topped with the patented spring-loaded ZipWall Jack enables you to screen off your work area with plastic sheeting, light canvas tarp or drop cloth.



TopSider™ Ceiling Access Module

- Perform operations and maintenance tasks within suspended ceilings without risking dust contamination to surroundings
- Heavy-duty vinyl enclosure and a strong, extendable aluminum frame mounted on a mobile platform
- Wheel the unit underneath a ceiling panel, zip the side opening shut, secure the spring-loaded seal against the ceiling and perform the maintenance task.

COST \$3420



Barriers (Short Duration)

- Fire-resistant plastic
- Airtight
- Negative pressure



Minti Video

Shortcut to Minti ECU.Ink

Review: Class 3 & 4 Precautions

All class 1 & 2 precautions plus:

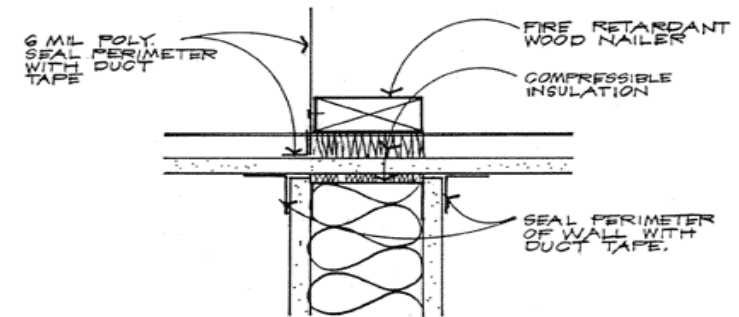
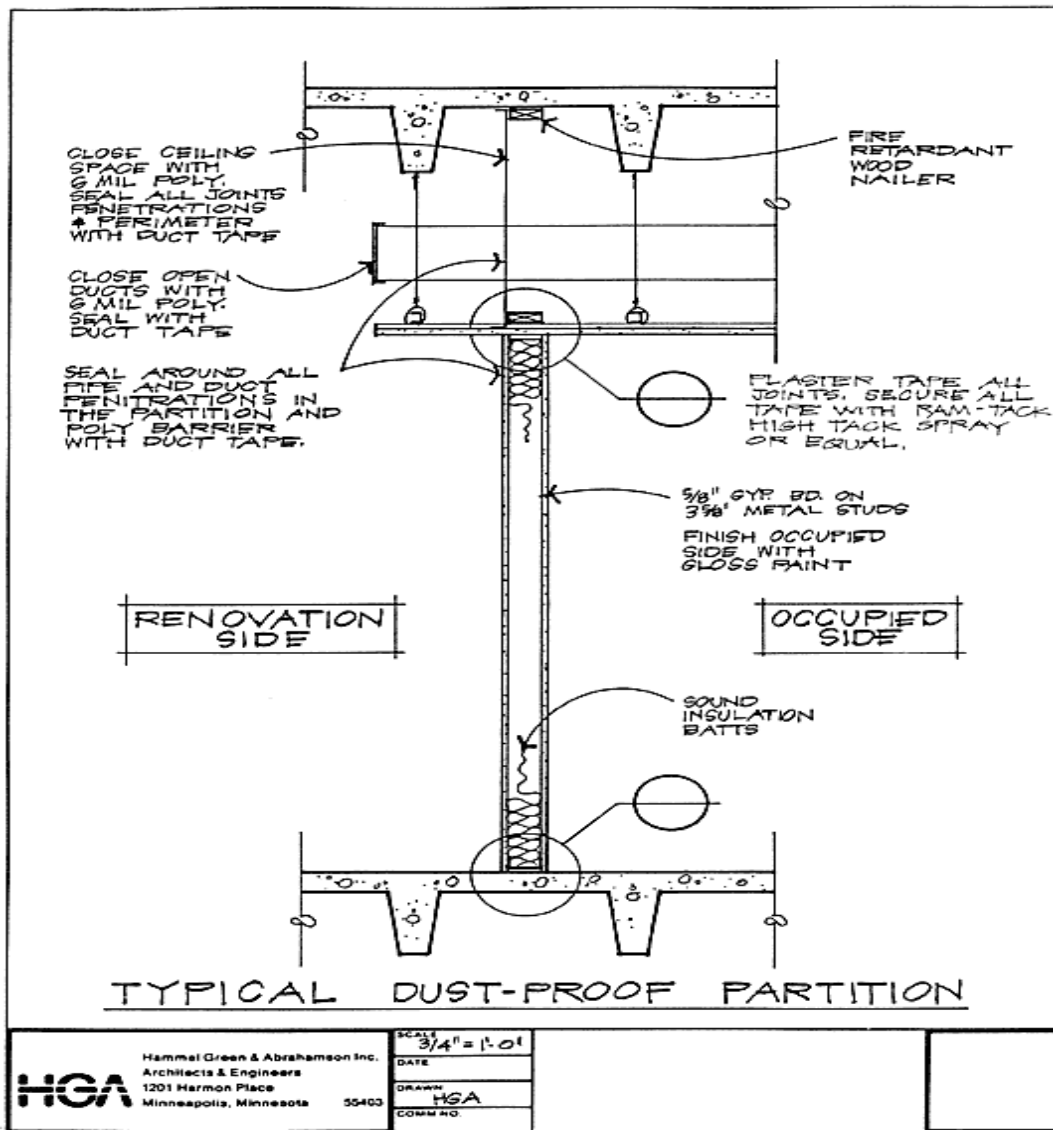
- Complete critical barriers
- Negative pressure
- Anteroom-access control (Class 4)
- Shoe covers
- Sealing leaks

	During	Upon Completion
CLASS III	<ol style="list-style-type: none"> 1. Remove or Isolate HVAC system in area where work is being done to prevent contamination of duct system. 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. 3. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 4. Contain construction waste before transport in tightly covered containers. 5. Cover transport receptacles or carts. Tape covering unless solid lid. 	<ol style="list-style-type: none"> 1. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department. 2. Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction. 3. Vacuum work area with HEPA filtered vacuums. 4. Wet mop area with disinfectant. 5. Remove isolation of HVAC system in areas where work is being performed.

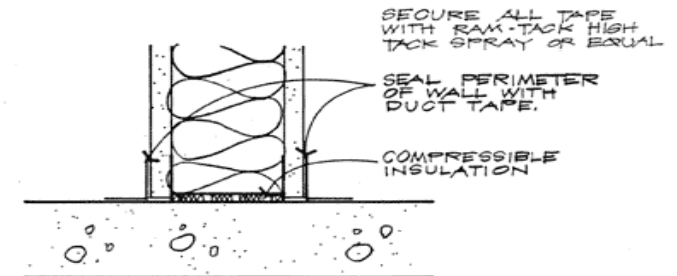




Fire Rated/Dust Partition Detail



○ PARTITION HEAD



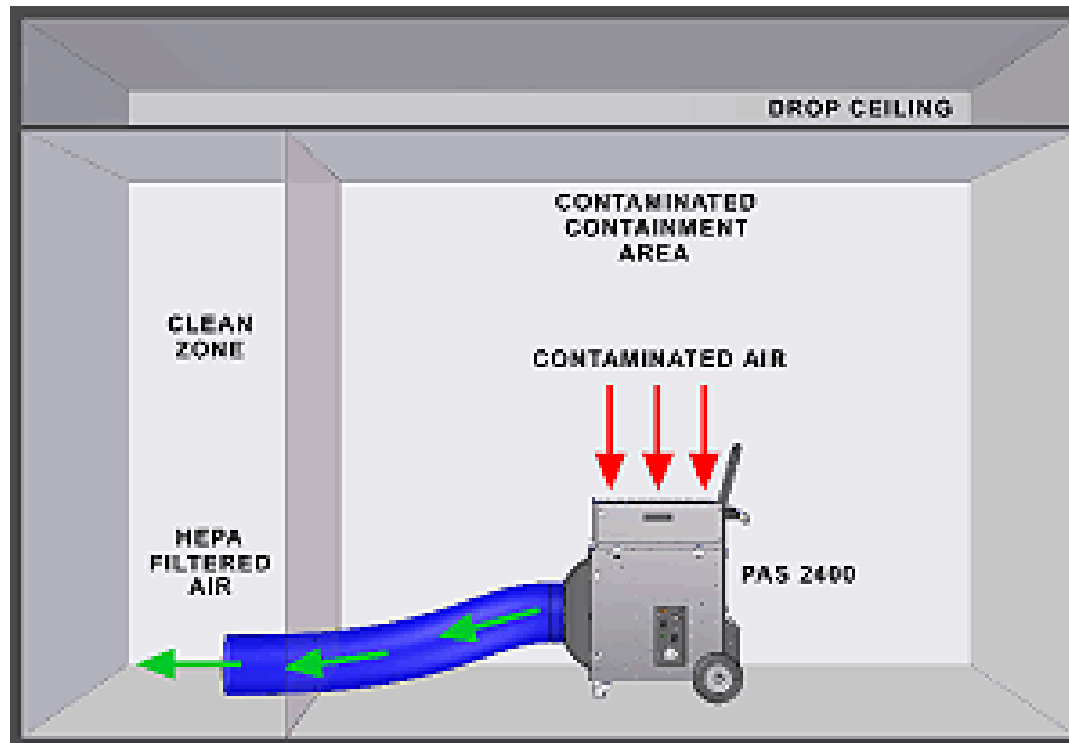
○ PARTITION SILL

During		Upon Completion
CLASS IV	1. All Class III precautions Plus:	1. Remove barrier material carefully to minimize spreading of dirt and debris associated with construction.
	2. 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 the work site.	2. Contain construction waste before transport in tightly covered containers.
	3. All personnel entering work site are required to wear shoe covers. Shoe covers must be changed each time the worker exits the work area.	3. Cover transport receptacles or carts. Tape covering unless solid lid
	4. Seal holes, pipes, conduits, and punctures appropriately.	4. Vacuum work area with HEPA filtered vacuums.
		5. Wet mop area with disinfectant.
		6. Remove isolation of HVAC system in areas where work is being performed.
		7. Do not remove barriers from work area until completed project is inspected by the owner's Safety Department and Infection Control Department and thoroughly cleaned by the owner's Environmental Services Department.



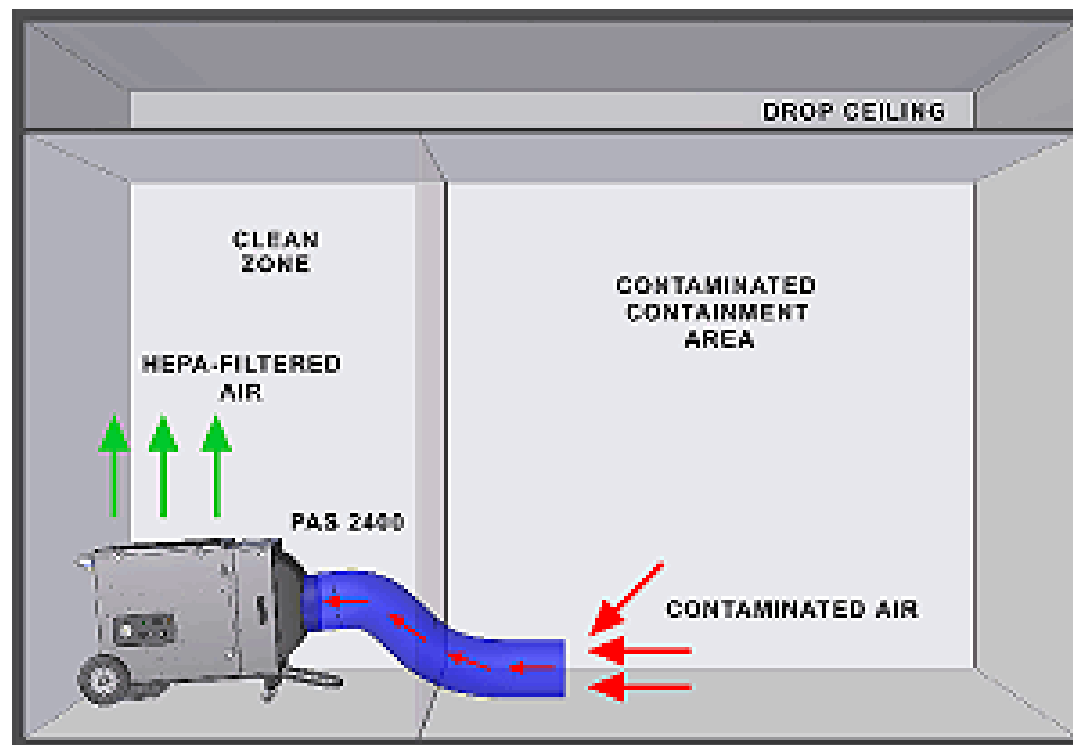
- **Negative pressure mode with the PAS located inside of the containment zone:**

The PAS pulls in contaminated air, filters out contaminants and propels the filtered air outside the containment zone through flexible ducting to negatively pressurize the work area.



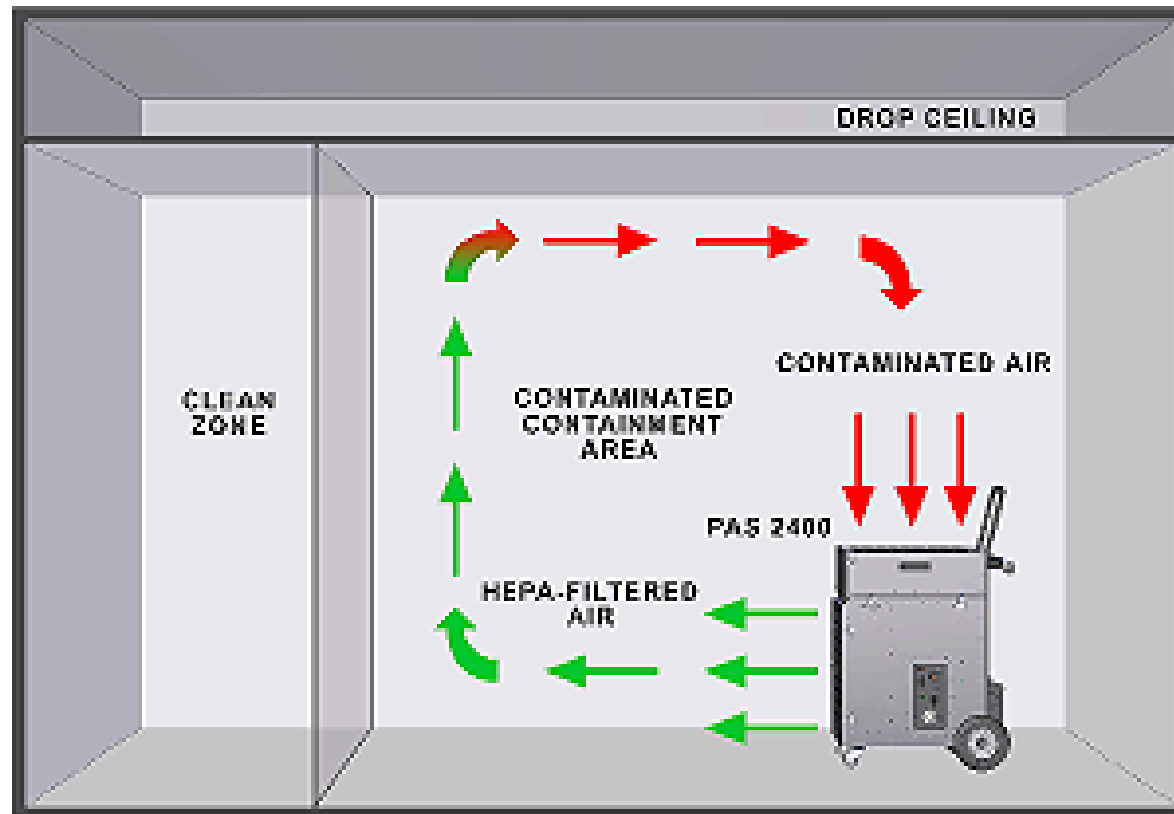
- **Negative pressure mode with the PAS located outside of the containment zone:**

Inlet ducting is used to pull contaminated air out of the zone to negatively pressurize it. Contaminants are removed by the PAS unit which is typically located adjacent to containment barrier so contaminated air can be fed directly into the inlet. Filtered air is ducted outside or to another area as required.



Continuous air cleaning and recirculation:

The PAS is located within the containment zone with no inlet or exhaust ducting, so there is no affect on room pressurization. The PAS accelerates the removal rate of airborne contaminants.



Indoor Air Quality

Monitoring

The facility owner will monitor effectiveness of ICRA procedures during the course of the project.

Guidelines for design & construction of healthcare facilities, 2006, AIA





Monitoring Critical Barriers

Micromanometer



- Document Pressure Differential inside containment vs. outside
- Negative Pressure of $-.02$ in wc
- Direct Reading spot checks or continuous monitoring
- Data logging
- Printer available
- Cost \$1,800

MODEL: EBT-720-Z1
 SERIAL: 90409040

DATA:

TESTID	PRESS	UNITS	TEMP	UNITS	HUMIDITY	UNITS	TIME	DATE
21	0.00038	in.H2O	78	°F	29.4	%rh	8:51:39	3/23/2006
21	0.00871	in.H2O	78.7	°F	30.9	%rh	8:51:55	3/23/2006
21	-0.0237	in.H2O	79.5	°F	30.9	%rh	8:52:25	3/23/2006
21	-0.0239	in.H2O	79.9	°F	31.4	%rh	8:52:55	3/23/2006
21	-0.0249	in.H2O	80.2	°F	31.6	%rh	8:53:25	3/23/2006
21	-0.0182	in.H2O	80.4	°F	31.3	%rh	8:53:55	3/23/2006
21	-0.019	in.H2O	80.5	°F	30.4	%rh	8:54:25	3/23/2006
21	-0.0179	in.H2O	80.4	°F	28.9	%rh	8:54:55	3/23/2006
21	-0.014	in.H2O	80.4	°F	27.6	%rh	8:55:25	3/23/2006
21	-0.011	in.H2O	80.3	°F	25.9	%rh	8:55:55	3/23/2006
21	-0.0111	in.H2O	80	°F	24.1	%rh	8:56:25	3/23/2006
21	-0.00749	in.H2O	58	°F	25.9	%rh	10:03:55	3/23/2006
21	-0.00798	in.H2O	57.9	°F	26	%rh	10:04:25	3/23/2006
21	-0.0093	in.H2O	57.7	°F	26	%rh	10:04:54	3/23/2006
21	-0.012	in.H2O	57.7	°F	25.9	%rh	10:05:25	3/23/2006
21	-0.0138	in.H2O	57.6	°F	25.9	%rh	10:05:55	3/23/2006
21	-0.0143	in.H2O	57.5	°F	26	%rh	10:06:25	3/23/2006
21	-0.0148	in.H2O	57.4	°F	26.1	%rh	10:06:54	3/23/2006
21	-0.016	in.H2O	57.4	°F	26.1	%rh	10:07:24	3/23/2006
21	-0.0173	in.H2O	57.3	°F	26.2	%rh	10:07:54	3/23/2006
21	-0.0185	in.H2O	57.2	°F	26.3	%rh	10:08:24	3/23/2006
21	-0.015	in.H2O	57.2	°F	26.2	%rh	10:08:54	3/23/2006
21	-0.0137	in.H2O	57	°F	26.3	%rh	10:09:24	3/23/2006
21	-0.0149	in.H2O	57	°F	26.3	%rh	10:09:55	3/23/2006

STATISTICS:

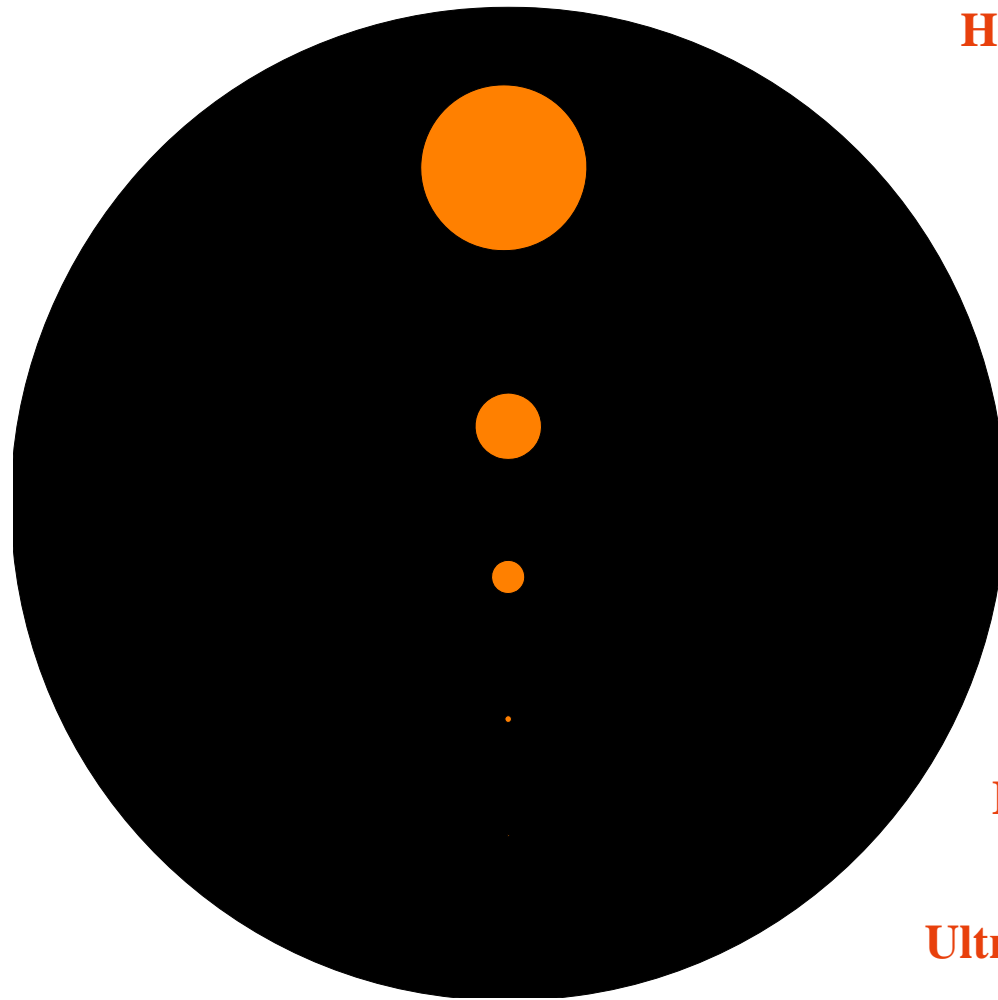
TESTID	COUNT	MINIMUM	MAXIMUM	AVERAGE	UNITS	READING TYPE
21	158	-0.0249	0.00871	-0.0128	in.H2O	
21	158	57	80.5	66.8	°F	
21	158	15.8	31.6	21.5	%rh	

Monitoring Construction Dust in Health Care Facilities



Sizing Particles and Dust

Particles < 0.1 micrometer diameter



Human Hair 120 μm

Visible Dust 25 μm

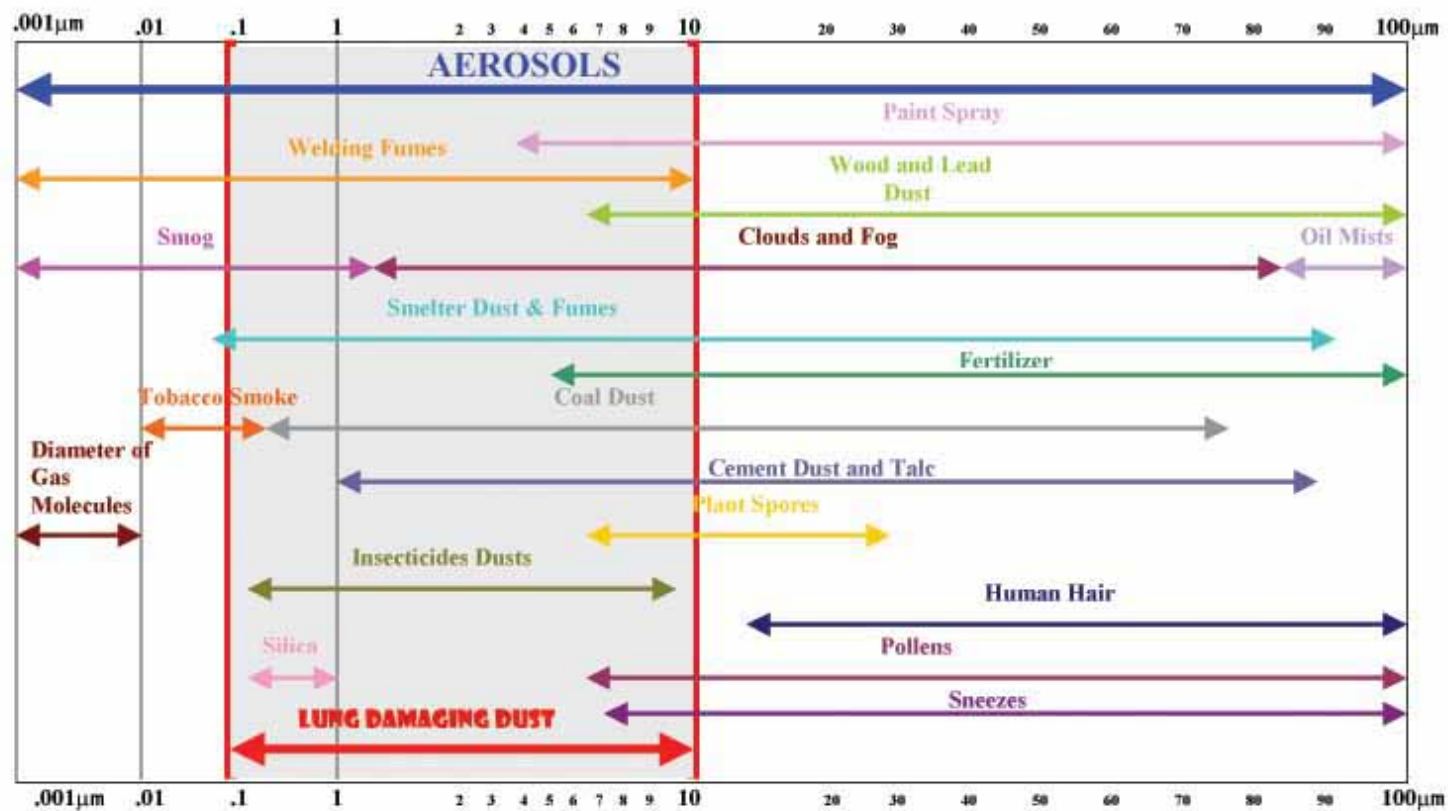
Common Allergens 5-10 μm

Non-visible Dust 10 μm

Metallic Fumes 0.3-1 μm

Ultrafine Particles < 0.1 μm

Relative Size of Lung Damaging Particles



Particle Diameter (μm) microns
 $1.0 \mu\text{m} = .000254 \text{ inches}$

* Some information reproduced from Aerosol Technology by William Hinds 1982.

Photometers



- Direct reading of ambient levels in mg/m³
- Data logging of exposure over time
- Generate hard copy reports to document levels
- Measure particles from .1µm -100µm
- Battery or AC powered
- \$3,400 - \$4,200

Optical Particle Counter (OPC)

Size distribution for mid-size particles (fine & coarse)

Help identify probable source and potential exposure impact



- Uses light-scattering technology differently
- Estimates number concentrations from individual particle sizes,
- Breaks down particle count into 2- 6 bins by size
- 0.3, 0.5, 1, 3, 5, and 10 micron
- Commonly used for
 - Clean room monitoring ie: Class 5
 - 3250 particles at .5 micron per ft³
 - 29 at 5.0 microns
 - Filter testing & leak detection
 - Range .3 to 10 Micron
 - Data Logging
 - \$,3500

External Construction

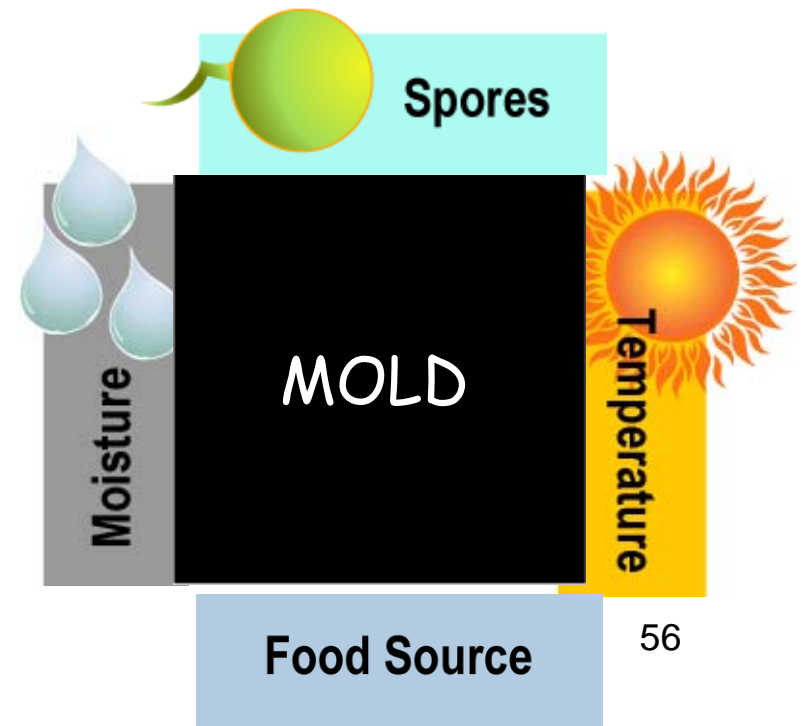
- Keep the facility air pressure positive to the outside
- Ensure that roughing filters are changed frequently and primary filters properly installed
- Seal and caulk windows
- Keep doors closed as much as possible
- Wet dust surfaces avoid track dirt

Building tie-in planning



Water Damage Management

- Reactive
 - respond to water incident
 - determine extent of water damage
 - cut out or dry
- Proactive
 - water resistant material
 - preservative application
 - proper installation



Rate of Growth for Selected Fungi

<u>Fungus</u>	Rate of colony <u>formation at</u> <u>30° C (days)</u>
Aspergillus species	2-3
Blastomyces dermatitidis (mold)	5-21
Candida albicans	1-2
Coccidioides immitus	4-10
Cryptococcus neoformans	1-2
Histoplasma capsulatum (mold)	5-21
Mucor species	1-2
Penicillium species	2-3
Rhizopus species	1-2

Infrared Thermometer Can Detect Wetness



Warm surface



Cool surface

Other Components of ICRA

- Noise & vibration
- Indoor air quality
- Monitoring indoor air

Hospitals: Noise where Doctors and Patients Need Quiet

Hospitals & Noise

- High levels: (65-85 db)
- Increased 25-40% since 1960's
- Interfere with patient rest and adversely affect outcomes
- Can increase stress levels in healthcare workers
- Construction increases noise levels

Ulrich (2001) Effects of Healthcare Environmental Design on Medical Outcomes.
http://www.designandhealth.com/edu_res/Roger%20S.%20Ulrich%20p49.pdf

The impacts of Noise on the Healing process

- Lower Speech Intelligibility
- Sleep Disruption and Awakening
- Decreased Oxygen Saturation
- Elevated Blood Pressure
- Increased Heart and Respiration Rates
- Decreased Rate of Wound Healing
- Higher Incidence of Re-Hospitalization

Keep Noise and Dust Away From Most sensitive
Arrears of The Hospital





Dewalt Cncrete Drill.mpg

Tool Performance, db rating

Manufacturer	Tool Type	Feature	Model #	db rating *
DeWalt	Screw Gun	Silent Clutch	DW276	84.0
Makita	Screw Gun	Silent Clutch	6823N	86.0
Milwaukee	Screw Gun	Regular Clutch	6798-1	100.0

* not tested under controlled conditions

What did we forget?

Documentation!!!

Guidelines for environmental infection control in health-care facilities. CDC, 2003.

Infection Control Construction Permit					
			Permit No.		
Location of Construction			Project Start Date		
Project Coordinator			Estimated Duration		
Contractor Performing Work			Permit Expiration Date		
Supervisor			Telephone		
YES	NO	CONSTRUCTION ACTIVITY	YES	NO	INFECTION CONTROL RISK GROUP
		TYPE A: Inspection, non-invasive activity			GROUP 1: Low Risk
		TYPE B: Small scale, short duration, moderate to high levels			GROUP 2: Medium Risk
		TYPE C: Activity generates moderate to high levels of dust, requires greater than 1 work shift for completion			GROUP 3: Medium/High Risk
		TYPE D: Major duration and construction activities requiring consecutive work shifts			GROUP 4: Highest Risk
CLASS I		1. Execute work by methods to minimize raising dust from construction operations. 2. Immediately replace any ceiling tile displaced for visual inspection.			
CLASS II		1. Provides active means to prevent air-borne dust from dispersing into atmosphere 2. Water mist work surfaces to control dust while cutting. 3. Seal unused doors with duct tape. 4. Block off and seal air vents. 5. Wipe surfaces with disinfectant.			
CLASS III		1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of the duct system. 3. Complete all critical barriers or implement control cube method before construction begins. 4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 5. Do not remove barriers from work area until complete project is thoroughly cleaned by Env. Services Dept.			
Date					
Initial					
CLASS IV		1. Obtain infection control permit before construction begins. 2. Isolate HVAC system in area where work is being done to prevent contamination of duct system. 3. Complete all critical barriers or implement control cube method before construction begins. 4. Maintain negative air pressure within work site utilizing HEPA equipped air filtration units. 5. Seal holes, pipes, conduits, and punctures appropriately. 6. 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 the work site.			
Date					
Initial					
Additional Requirements (Additions to this permit are noted by attached memoranda)					
Date		Initials		Date	
Permit Request By				Permit Authorized By	
Date				Date	

DAILY INSPECTION LOG

Construction Surveillance of Major Demolition, Excavation, and Construction Projects

Instructions:

1. Department managers and Construction personal are to inspect the construction area daily and determine if the expectations below are met.
2. If any **EXPECTATIONS** are **NOT MET**:
 - a. Fill out section **A** below.
 - b. Contact the project manager immediately to make corrections.
 - c. Complete section **B**.
 - d. Fax completed form to Infection Control & Prevention Service and Construction Project mgr.
3. If all expectations are MET, log form.
4. If unsure, discuss with project manager or on-site contractor.

Site/Department	Today's Date	Time
Completed By		Phone

A.

EXPECTATION	MET	NOT MET
Construction signs are posted		
Traffic patterns are clearly identified		
Non-construction areas are free of construction dust		
Ceiling tiles removed for visual inspection are immediately replaced		
Windows are closed to prevent circulation of dust/debris		
Debris is transported in tightly covered containers		
Construction area is cleaned on a daily basis		
No signs of water leakage		
No signs of pests (no visible signs of rodents, insects, birds, etc.)		
Negative pressure monitors are operational		
Negative pressure maintained in construction zone		
All exits are maintained		

B. For items checked **NOT MET**, describe corrections made (who, what, when, where):

Summary: Constructing Risk Assessment

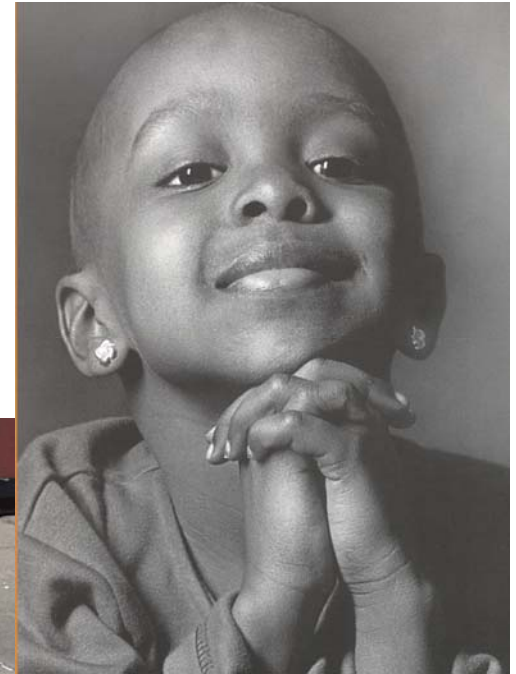
- Proactive
- Involves multidisciplinary team
- Includes:
 - Infection Control Risk Assessment
 - Noise, vibration, dust, air quality,
 - Utility requirements, life safety & protection of occupants

Our Challenge:

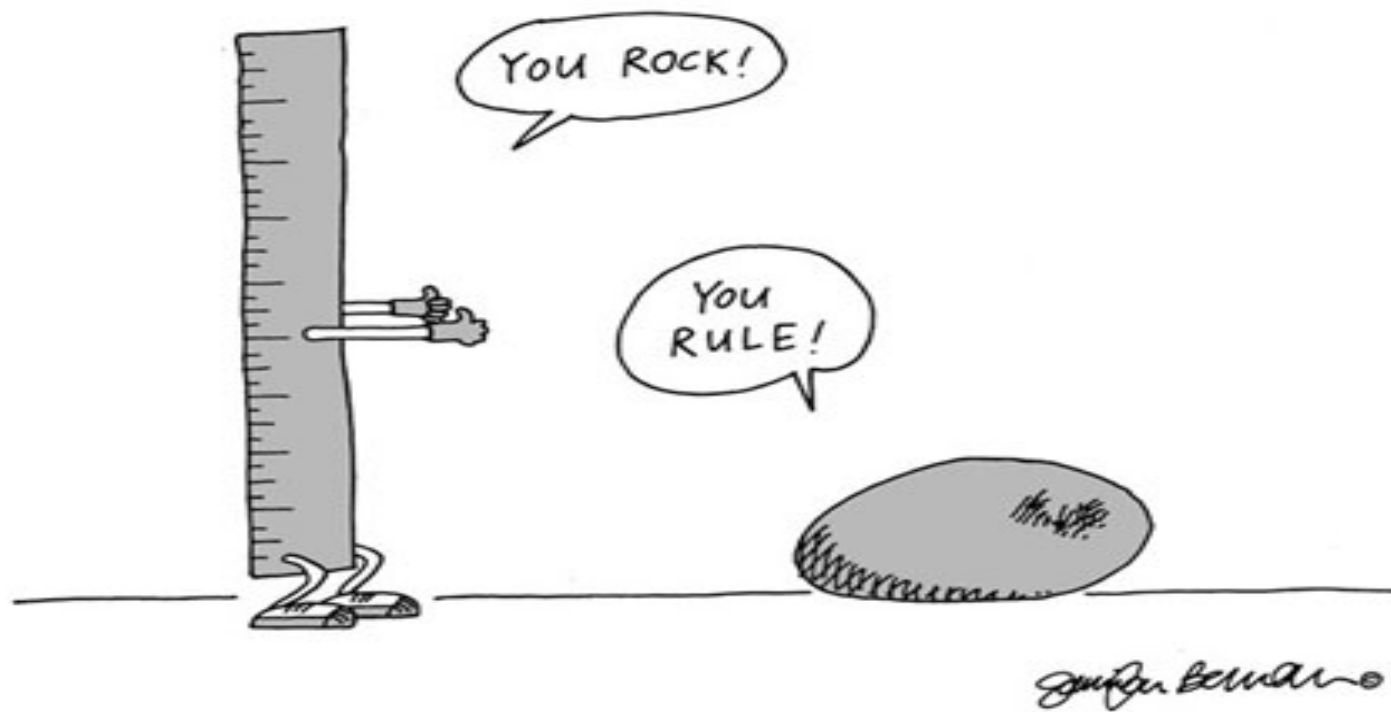
- To make a difference by changing our attitude toward construction and maintenance
- To use the proper techniques even when it is not the easiest thing to do
- To think before we begin a project

And most of all

Our Goal is to, Save Lives!!!



Questions?



Lets do some actual Healthcare construction
work requests assessments

Case Study

Directions: Use the ICRA Matrix to complete an Infection Control Construction Permit for each of the following work orders.

Work Order #1

You are asked to install computer cabling for new monitors in ambulatory care cardiology clinic. The job should take about 4 hours and you will need to access the space above the ceiling.

1. What type of construction activity is this job?

A B C D

2. What patient risk group are you dealing with?

LOW MEDIUM HIGH HIGHEST

3. What class of precautions is required for this job?

Class I Class II Class III Class IV

4. How should the following aspects of the construction risk assessment be addressed during this job?

- Noise: _____
- Vibration: _____
- Utility requirement _____
- Indoor air quality _____

5. Will other areas of the facility be impacted by this work.

6. How many ICRA's are necessary for this job?

Notes / Comments:

Case Study

Directions: Use the ICRA Matrix to complete an Infection Control Construction Permit for each of the following work orders.

Work Order #2

You are asked to install computers in two operation rooms. The phone / data closet is outside the department. The project manager has informed you that infection prevention is a primary patient safety goal for the hospital. Surgical operating rooms adjacent to the ones you will be working in will be in operation.

1. What type of construction activity is this job?

A B C D

2. What patient risk group are you dealing with?

LOW MEDIUM HIGH HIGHEST

3. What class of precautions is required for this job?

Class I Class II Class III Class IV

4. How should the following aspects of the construction risk assessment be addressed during this job?

- Noise: _____
- Vibration: _____
- Utility requirement _____
- Indoor air quality _____

5. Will other areas of the facility be impacted by this work.

6. How many ICRA's are necessary for this job?

Notes / Comments:

Case Study

Directions: Use the ICRA Matrix to complete an Infection Control Construction Permit for each of the following work orders.

Work Order #3

You need to replace an old sink and warped laminate countertop at the nursing station in the hospital oncology unit. The pediatric unit is directly below the oncology unit.

1. What type of construction activity is this job?

A B C D

2. What patient risk group are you dealing with?

LOW MEDIUM HIGH HIGHEST

3. What class of precautions is required for this job?

Class I Class II Class III Class IV

4. How should the following aspects of the construction risk assessment be addressed during this job?

- Noise: _____
- Vibration: _____
- Utility requirement _____
- Indoor air quality _____

5. Will other areas of the facility be impacted by this work.

6. How many ICRA's are necessary for this job?

Notes / Comments:

Case Study

Directions: Use the ICRA Matrix to complete an Infection Control Construction Permit for each of the following work orders.

Work Order #4

You are going to be replacing carpet in the small visitor's lounge located outside of the hospital ICU wing.

1. What type of construction activity is this job?

A B C D

2. What patient risk group are you dealing with?

LOW MEDIUM HIGH HIGHEST

3. What class of precautions is required for this job?

Class I Class II Class III Class IV

4. How should the following aspects of the construction risk assessment be addressed during this job?

- Noise: _____
- Vibration: _____
- Utility requirement _____
- Indoor air quality _____

5. Will other areas of the facility be impacted by this work.

6. How many ICRA's are necessary for this job?

Notes / Comments:

Case Study

Directions: Use the ICRA Matrix to complete an Infection Control Construction Permit for each of the following work orders.

Work Order #5

You are going to be repairing walls and painting the operation rooms.

1. What type of construction activity is this job?

A B C D

2. What patient risk group are you dealing with?

LOW MEDIUM HIGH HIGHEST

3. What class of precautions is required for this job?

Class I Class II Class III Class IV

4. How should the following aspects of the construction risk assessment be addressed during this job?

- Noise: _____
- Vibration: _____
- Utility requirement _____
- Indoor air quality _____

5. Will other areas of the facility be impacted by this work.

6. How many ICRA's are necessary for this job?

Notes / Comments: