Policy Number:	**1.09**	**Original Date Issued:**	August 2001
Section:	General Policies	**Date Reviewed:**	August 13, 2013
Title:	Infection Prevention in Construction, Renovation and Maintenance	**Date Revised:**	August 13, 2013
Regulatory Agency:	**TJC; CAP; OSHA, CDC, AIA**		

I. POLICY:

A. This policy describes guidelines to be followed during all phases of maintenance, renovation and construction in an effort to provide patients, employees, volunteers, and visitors with an environment that is safe from potential infections.

B. This policy provides a Matrix to assist with determining barriers and precautions needed for each project. The type of barriers and precautions is based both on the extent and duration of the project and on the patient population in the construction area.

C. All facility employees, contractors, and vendors who are involved with maintenance, alteration, demolition, or construction are required to comply with the infection prevention procedures described in this policy.

D. All contractors and vendors must meet the employment requirements of Children's. Contractors are responsible for the oversight of this process.

E. The Infection Control Risk Assessment (ICRA) shall be completed by a member of the Infection Prevention Department.

II. VARIANCES:

A. Occasionally, project specific variances may be required to both accomplish the required renovations and / or provide appropriate infection prevention measures. Decisions regarding variances will be made after discussion among the multi-disciplinary team. All modifications require Infection Prevention approval prior to implementation.

B. All variances must be documented as part of the Infection Control Risk Assessment.

III. RESPONSIBILITIES:

A. **Facilities Planning and Development**: informs Infection Prevention of planned construction projects, facelifts and /or enhancement projects within the system and plans and implements infection - preventive actions. Facilities Planning and Development is also responsible for informing all Contractors of this policy and ensuring their adherence to this policy.

B. **Engineering / Maintenance Department**: informs Infection Prevention of planned construction projects, facelifts and /or enhancement projects within the system and plans and implements infection - preventive actions.

C. **Information Systems & Technology**: informs Infection Prevention of planned projects that may include telecommunications, data or other technology-related cabling or equipment projects.

D. **Facilities Management, Biomed and Security**: implements infection-preventive actions when carrying out daily maintenance activities and is responsible for informing all contractors of the policy and ensuring their adherence to this policy.

E. **Infection Prevention**: advises on interventions to limit infection risk during construction and maintenance projects. Ensures that major infection control components are addressed as appropriate and justified by relevant guidelines and standards.

F. **Construction Contractors**: effectively manages workers and materials to limit the dispersal of construction dust and debris. Complies with the Infection Control Risk Assessment (ICRA).

IV. PROCEDURE:

A. Maintenance, Minor Renovation, and Beautification. See Part IV to determine:

1. Type of Construction Activity (page 4)
2. Patient Risk (page 5)
3. Activity class (page 7)
4. List of actions necessary for each project (page 6-9)

B. New Construction

1. An inter-disciplinary team including architects, contractors, (including MEP firms), Facilities Planning & Development, Facilities Management, EVS, Safety, Engineering, IS & T etc., and Infection Prevention will evaluate new construction from concept through design and completion for infection prevention concerns.
2. An Infection Control Risk Assessment (ICRA) consisting of Construction Activity class, Patient Risk Group and Activity Class will be completed. The Infection Prevention representative is responsible for completion of ICRA/Construction Permit (Attachment A).
3. For large scope projects or projects that have impacts related noise, vibration, odors, or environmental safety, a Pre-Construction Risk Assessment (PCRA) is necessary. This is an Environment of Care compliance item per The Joint Commission. The ICRA is one part of this assessment.

C. Design Phase

Infection prevention personnel are involved in the planning phases for all renovation and new construction projects specific to the following major components:

1. Number and placement of isolation rooms.
2. Air handling systems as they pertain to air exchanges/hour in positive/negative pressure rooms in specific areas.
3. Number and placement of hand washing facilities, soap, paper towel and alcohol rinse dispenser placement.
4. Waste containment, transport, and disposal.
5. Selection of finishes and surfaces that can be effectively cleaned.
6. Selection of plumbing fixtures and pipes made of such material as to inhibit microbial growth.
7. Accommodation of personal protection equipment including sharps containers.
8. Storage of clean/sterile supplies.
9. Clean/soiled equipment storage.
10. Assessment of specific preventative activities and barriers needed during project.
11. Staff and patient traffic patterns for the duration of the project.
12. Determination of air and water /sampling needs during and after completion of the project.

D. Operational Phase

1. **Infection Prevention personnel** will attend project meetings according to pre-determined schedules called for by the scope of the project and as needed to ensure Infection Prevention measures are in adherence.
2. **Project Manager ensures** that an Infection Control Risk Assessment/Permit (See Attachment A) is completed and posted prior to beginning any work. Additionally, for large scope projects, a PCRA may be needed. The permit must be displayed at entrance to work area until project is completed.
3. **Project Manager also ensures** that the area preparation, demolition, construction, cleanup, preparation for return to service and final project review meet the designated Infection Prevention standards.
4. **Contractors**: are to comply with Infection Prevention policies. Failure to comply with the procedures described in the ICRA and the applicable Infection Prevention policies could be reason for the termination of the contract.

5. **Contractor** is responsible for maintaining equipment and replacement of HEPA and other filters, in accordance with manufacturer's recommendations.
6. **The Industrial Hygienist, Epidemiologist, Project Manager and Safety Manager** has the authority to stop a project. All work can be stopped when an infection prevention deficiency exists. The contractor will take immediate action to correct all deficiencies. Failure of the contractor to correct such deficiencies may result in corrective action by Children's.

E. Definitions of Construction Activity, Patient Risk Groups and Activity Class

STEP 1 – Defining the scope of the project

The construction activity types are defined by the amount of dust generated, the duration of the activity, and the amount of shared (adjacent areas) HVAC systems.

Type A

Building upkeep, inspections 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 in a group 1 area, 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

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, drilling of walls or ceiling where dust migration can be controlled.

Type C

Any 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 wall for painting or wall covering, removal of floor coverings, wall paper, baseboards, ceiling tiles and casework, new wall construction, minor ductwork or electrical work above ceilings, major cabling activities, and any activity which cannot be completed within a single work shift.

Type D

Major demolition and construction projects. Includes, but is not limited to, activities which require heavy demolition or removal of walls, ceiling system, new construction, and consecutive work shifts.

STEP 2 – Definitions of Patient Risk Group (Step #2)

The following table ranks areas of the hospital as to the susceptibility of the patients contained in that area.

Color coded CAD drawings detailing Patient Risk Group markup are available to use as a resource for conducting work.

GROUP 1 LOWEST	GROUP 2 MEDIUM	GROUP 3 HIGH	GROUP 4 HIGHEST
1. Office areas not adjacent to patient care areas 2. Engineering 3. Environmental Services	1. Patient Care Areas 2. Playrooms/Schoolrooms 3. Admission Areas 4. PT/OT 5. Cafeteria 6. Admissions 7. Store Room 8. Outpatient Areas 9. MOB (except Hem-Onc) 10. Children's Satellites(except Am Surg) 11. Day Surgery 12. Rehab 13. Morgue 14. Sleep Lab/Audiology 15. CIRU 16. Occupational Health 17. Marcus Autism Center	1. Emergency Rooms 2. PACU 3. Microbiology Lab 4. Pathology/Histology Lab 5. Virology 6. Radiology/MRI 7. Interventional Radiology 8. Nuclear Medicine 9. CF Centre	1. Operating Room 2. Neonatology 3. Hematology / Oncology (Inpatient) 4. All Intensive Care Units 5. Cardiac Catheterization & Angiography Areas 6. Solid Organ Transplant Patients 7. Central Processing/Sterile Processing 8. Sibley Heart Center-ECH1 9. BMT 10. Dialysis Unit 11. Ambulatory Surgery-MM (1) 12. Ambulatory Surgery-Gwinnett (1) 13. Pharmacy 14. GI and Special Procedures 15. AFLAC Outpatient (1) 16. Cellular Therapies Lab

(1) Group 4 classification for ambulatory surgery and outpatient assumes work conducted during patient occupancy. Consult Infection Prevention for specific after hours infection Prevention Measures.

STEP 3 – Defining the Activity Class - Determine Activity class by matching the construction activity (page 3) with the designated risk group (see table above) in the matrix below. The Roman numeral indicates the Activity Class.

Construction Activity → RISK LEVEL (Patient Group) ↓	TYPE "A"	TYPE "B"	TYPE "C"	TYPE "D"
Group 1	I	II	II	III or IV
Group 2	I	II	III	IV
Group 3	I	II	Usually III Possible IV	IV
Group 4	II	Usually III Possible IV	Usually III Possible IV	IV

Once the Activity Class is determined, refer to the following chart for procedures to follow regarding the project.

STEP 4 - Determining the Appropriate Infection Prevention Procedures

CLASS I	1. Obtain approval from area supervisor to perform the work at a specific time. 2. Isolate the area of activity from patients. 3. Close all doors if possible; if door cannot be closed, restrict patient traffic through work site 4. Ceiling tiles should be replaced as soon as possible. 5. Wipe surfaces within work site with disinfectant at completion of job.
CLASS II	1. Obtain approval from area supervisor to perform the work at a specific time. 2. Either use the dust containment cart or erect plastic barriers or hard barriers 3. Isolate and seal HVAC system return air duct in area where work is being performed. 4. Contain construction waste before transport in tightly covered containers with non-porous covers. 5. HEPA Vacuum all surfaces or wet mop periodically and at completion of project to reduce dust. 6. Wipe surfaces within work site with disinfectant at completion of job.

CLASS III	1. Obtain infection control approval and approval from area supervisor before construction begins. 2. Isolate and seal HVAC return air duct system in area where work is being done. When feasible, turn off airflow through the VAV controlling temperature in the space. 3. Implement dust containment cart or install required barriers before construction begins. 4. Maintain negative air pressure within work site via HEPA filtered negative air machines or fans. If the project requires returning construction site air to occupied spaces, the air must be passed through a terminal HEPA filter prior to exhausting into patient areas (machine HEPA filter + second HEPA filter). Add terminal exhaust via stationary HEPA Filter etc. 5. Provide sticky walk-off mats at entrance to work area. Mats are to be replaced as needed throughout the workday. 6. Any areas, which show evidence of mold or fungal growth, must be evaluated by Infection Prevention to determine removal protocol. 7. Transport construction waste in tightly covered containers. If carts are used, the wheels should be wet-wiped with disinfectant before leaving the work site. 8. The work area shall be maintained reasonably clean and free of accumulations of dust and debris. 9. Vacuum work area with HEPA filtered vacuum and wipe all vertical and horizontal surfaces with disinfectant before removing barriers. 10. Run water for at least 15 minutes from any lines in which water service has been interrupted and/or new additional lines installed during activities off of main feeds. 11. Thoroughly clean inside barrier then remove barrier materials carefully in a manner that prevents dust dispersal. 12. Repeat cleaning process of wiping all vertical and horizontal surfaces with disinfectant and vacuum area with HEPA vacuum after barriers are removed.

CLASS IV	1. Obtain Infection Prevention approval and approval from area supervisor before construction begins. 2. Isolate and seal HVAC system return air duct in area where work is being done. When feasible, turn off airflow through VAV controlling temperature in the space. 3. Install barriers before construction begins. 4. Seal holes, pipes, conduits, and punctures appropriately. 5. Maintain negative air pressure within work site via HEPA filtered negative air machines or fans. If the project requires returning construction site air to occupied spaces, the air must be passed through a terminal HEPA filter prior to exhausting into patient areas (machine HEPA filter + second HEPA filter). Add terminal exhaust via stationary HEPA Filter etc. 6. For negative air machines exhausted into occupied areas, Infection Prevention will verify negative air machine performance with a laser particle counter before starting work. 7. A sufficient number of negative air machines or fans will be used to maintain a differential of at least -0.02 inches of water pressure relative to adjacent corridors or patient care areas. Pressure shall be continuously monitored via pressure differential monitor. 8. Pressure shall be continuously monitored via pressure differential monitor. 9. Construct anteroom unless space is not available in the renovation area**.** All personnel are required to pass through anteroom during entrance and egress into the work site. 10. For egress into Group 4 patient areas, or when conducting significant dust generating activities (i.e. demolition, wallboard installation, etc.), workers are required to don disposable clothing before leaving the site. 11. The work area shall be maintained clean and free of accumulations of dust and debris. 12. Contractors are required to comply with pre-determined traffic patterns 13. Provide sticky walk-off mats at entrance to work area. Mats are to be replaced as needed throughout the workday. 14. Maintain egress free of dirt/debris through use of HEPA vacuum cleaner or wet mop with frequently changed water. 15. Transport construction waste in tightly covered containers with non-porous covers (i.e. no linen) If carts are used, the wheels should be wet-wiped with disinfectant before leaving the work site. 16. Vacuum work areas with HEPA filtered vacuums and wipe all vertical and horizontal surfaces with disinfectant before removing barriers. 17. Run water for at least 15 minutes from any lines in which water service has been interrupted and/or new additional lines installed during activities off of main feeds. 18. Thoroughly clean inside barrier then remove barrier materials in a manner that prevents dust dispersal. 19. Repeat cleaning process of wiping all vertical and horizontal surfaces with disinfectant and vacuum area with HEPA vacuum after barriers are removed.

V. Additional General Infection Prevention Considerations

A. Criteria For Select Products and Materials

1. Fire rated sheet plastic with a thickness of at least 6-mil (or other sheeting material approved by Children's safety manager).
2. HEPA filtered negative air filtration machines, model Abatement Technologies PAS 2000 or similar, with heavy duty, flexible steel or tygon reinforced duct
3. Omniguard pressure differential monitor or similar for Class III and IV projects
4. Walk-off mats and sticky mats
5. Children's approved disinfectant
6. Use sweeping compound for all dry sweeping within barrier.
7. HEPA vacuum cleaner. Upright Pullman Holt HEPA 102 ASB or similar.
8. Children's approved Dust Containment Cart.

B. Barriers

Safety and/or emergency egress requirements beyond the scope of Infection Prevention Policies may be required. Consult Safety prior to barrier implementation and detail in Interim Life Safety documentation *(ILS-Construction Safety-EOC Policy 5-11).*

1. A closed door with painter's tape (NO DUCT TAPE) applied over the frame and door is acceptable for projects which can be contained within a single room.
2. Construction, demolition or reconstruction not capable of containment within a single room must have one of the following barriers erected:
   - A drywall barrier is to be used for all projects that exceed 15 days in length. Drywall barriers erected with joints should be sealed with painter's tape (NO DUCT TAPE). Alternatively to be determined by an IH, tight plastic barriers may be used that extend from floor to true ceiling (including spaces above the ceiling). Seams must be sealed with painter's tape to prevent dust and debris from escaping.

3. Alternatively to be determined by an IH, an anteroom or double entrance openings may serve as areas for workers to don protective clothing when required.

C. General Infection Prevention Considerations

1. Any dust tracked outside of barrier shall be removed immediately. Clean areas outside barrier with HEPA filtered vacuum or damp mop/rag
2. Any ceiling access panels opened for investigation beyond contained areas shall be replaced immediately when unattended.
3. Any areas, which show evidence of mold or fungal growth, must be evaluated by the Industrial Hygienist/ Epidemiologist to determine removal protocol.

4. When removing wallpaper, spray the back of the paper with approved fungicide to decrease the dispersion of microorganisms. If fungal spores are encountered, contain area with plastic and tape and contact the Industrial Hygienist / Epidemiologist for guidance on mold abatement. DO NOT PROCEED WITH DEMO WITHOUT APPROVAL FROM INFECTION PREVENTION
5. For openings into existing ceilings:
    - Use dust containment cart when mandated by the relevant Activity Class and Patient Risk Group (pages 4 through 6)
    - If dust containment cart does not fit into work area, provide plastic enclosure around ladder sealing off opening, fitted tight to ceiling and floor.
    - After tiles are replaced, carefully remove plastic in manner to prevent dust dispersal and discard

D. Negative Pressure Considerations

1. Use HEPA filtered air machines and maintain a negative pressure differential of at least -0.02" water gage.
2. Fans exhausted directly outside can be used for negative pressure, provided the exhaust is at least 100 feet from patient / visitor traffic or fresh air intakes, and provided the project does not involve mold / asbestos remediation.
3. Continuously monitor negative pressure for Class III and IV projects with an Omniguard pressure differential monitor or similar.
4. For projects requiring that construction site air be exhausted into occupied areas, the air from HEPA filtered air machines must pass through a terminal HEPA filter before entering the hospital.

E. Quality Control

1. Industrial Hygienist/Epidemiologist will regularly review site. Deficiencies will be reported to the Project Manager and Contractor.
2. Industrial Hygienist/Epidemiologist will determine the need to monitor particle counts in vicinity of construction work on an as-needed basis. The infection prevention representative will collect particle counts in HEPA-filtered before release to patient care.
3. Contractor is responsible for maintaining equipment and replacement of HEPA and other filters in accordance with manufacturer's recommendations.
4. For HEPA filtered air machines exhausted into occupied areas, Infection Prevention will verify negative air machine performance with a laser particle counter before starting work. Counts at terminal filter exhaust should be maintained at zero particles per cubic-meter of air (particles greater than 0.5 microns in size).

5. Industrial Hygienist/Epidemiologist, with cooperation from Engineering, will confirm that patient care areas are maintaining appropriate pressure differentials prior to project start.
6. Industrial Hygienist/Epidemiologist will review effectiveness of final clean before patient occupancy.
7. At the discretion of Industrial Hygienist/Epidemiologist, air sampling for bacteria or fungal spores may be conducted prior to occupancy of high-risk patient population areas.
8. Containment cart function, cleanliness, and filtration efficiency will be evaluated routinely as part of environmental rounds.

F. Training

1. All contract personnel are required to attend a pre-construction meeting. A representative from Safety and Infection Prevention should be present to communicate any specific job-related guidance.
2. All persons using the dust containment cart, including outside contractors, must be trained and certified by Children's Engineering personnel. Engineering will maintain written documentation of certified individuals. Infection Prevention personnel may also provide proper usage technique.

VI. REFERENCES

1. American Institute of Architects, Guidelines for Design and Construction of Hospital and Health-care Facilities, ed. A. Press. 2010, Washington, D.C.
2. Centers for Disease Control and Prevention and the Healthcare Infection Control Practices Advisory Committee, Guideline for Environmental Infection Control in Health-Care Facilities. 2006, CDC and HICPAC: Atlanta, GA.
3. Guidelines for Preventing Healthcare-associated Pneumonia, 2003. MMWR 2004;53(RR-3):1-36
4. The APIC State-Of-the-Art-Report on Construction and Renovation (SOAR), The role of infection control during construction in health care facilities, 2000. Bartley JM and the 1997, 1998, and 1999 APIC Guidelines Committees. American Journal of Infection Control 2000;28:156-169.
5. APIC Construction Toolkit 2nd edition 2002, http://apic.org/Resource_/TinyMceFileManager/Education/EPI-201-resources/EPI201_2012_resource_Construction_and_Renovation.pdf
6. Children's Healthcare of Atlanta Interim Life Safety- Construction Safety Policy (EOC Policy 5-11) http://careforceconnection/sites/policiesandprocedures/Environment%20of%20Care/5-11.pdf

7. Children's Healthcare of Atlanta Contractor and Sub-Contractor requirements for Hospital Construction Projects Policy (Administrative and Operational Policy 5-03) http://careforceconnection/sites/policiesandprocedures/Administrative%20and%20Operational/5-03.pdf

Children's Healthcare of Atlanta
INFECTION CONTROL RISK ASSESSMENT/CONSTRUCTION PERMIT

Location of Construction:	Project Start Date: Projected End Date:
Project Manager Name: And signature: Date:	Cell Phone/pager #
Contractor Name: And signature: Date:	Cell phone/pager #
Area Supervisor:	Telephone:

Construction Activity Circle one:

TYPE A: Inspection, non-invasive activity
TYPE B: Small scale, short duration, moderate level of dust
TYPE C: Activity generates moderate to high level of dust; requires greater than one shift to complete
TYPE D: Major construction activities

Infection Control Risk Group Circle one:
GROUP I Lowest Risk GROUP II Medium Risk GROUP III High Risk GROUP IV Highest Risk

Activity Class Circle one:
Class I Class II Class III Class IV

Job Specifications

	YES	NO
Construction Barricade		
Dust containment cart used		
Plastic sheeting		
Solid wall		
Barricades sealed, no penetrations		
Anteroom in place		
Barricade doors have closures		
Door frames gasketed, doors closed and sealed properly		
Adjacent ceiling areas intact		
Ventilation System		
Air returns closed and sealed or VAV shut off		
Negative air pressure at barricade entrance		
All windows and doors closed behind barricade		
Negative air machines or fans running		
Negative air machines filters clean		
Job Site		
Project area clean, debris removed daily		
Walk-off mats		
Debris removed in suitable container		
Debris removed at time specified		
Adjacent floor areas clean, no dust tracked		

Construction material brought in via:

Waste / Debris removed via:

Infection Prevention Representative
Name: Signature: Date:

Project Variances (only if necessary) - Document required **modifications**