

Construction in Healthcare Facilities

Short description

This section outlines the requirements to effectively conduct construction activities in healthcare facilities.

Contact person

Andrew Richardson

Name

770-613-2999

Phone number

HSEQ

Functional Department

arichardson@cce-inc.com

Email address

Responsible

Brent LeVander

Name

HSEQ

Functional Department

Approval

Geoff Preisman

Name

President and CEO

Title

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1 Objective and area of application

It is recognized that construction and renovation activities have the potential to impact patient care processes within the healthcare environment. The purpose of this section is to identify potential risks through the Pre-Construction Risk Assessment (PCRA) process, or other owner required process, that may arise from construction activities in healthcare facilities and to adequately develop risk mitigation strategies to minimize this risk and the potential hazards.

For example, improper ventilation design or maintenance has been associated with opportunistic infections in immune-compromised patients in a healthcare environment. Patients are often more sensitive to noise, vibrations, fungal organisms and dust typically disturbed by construction activity.

Elements to be considered in this PCRA process include, but are not limited to:

- Interim Life Safety Measures (ILSM)
- Infection Control Risk Assessment (ICRA)
- Utility interruptions/impacts
- Noise
- Vibration
- Environmental service impact
- Design and function of the new structure or area
- Assessment of environmental risks for airborne disease and opportunities for prevention
- Dust and moisture during construction, renovation or repairs

2 Superior and additional applicable documents

1000_GD_11_01_en_1.2 Group Principle on HSEQ

1000_GP_11_01_en_7.0 Group Policy on Health, Safety, Environment and Quality (HSEQ)

1000_SOP_11_01_en_2.0 SOP on HSEQ Management

1000_SOP_11_03_en_1.0 SOP on Leadership & Workers Involvement

1000_SOP_11_04_en_1.0 SOP on Health & Safety Standards of Work

1000_SOP_11_05_en_1.0 SOP on HSEQ Incidents & Accounting Rules

1000_SOP_11_06_en_1.0 SOP on Administration and use of the HSEQ management software
ACTIVE

NFPA 101- Life Safety Code

NFPA 99- Healthcare Facilities

This section of the HSEQ Manual applies to all Centennial employees and subcontractors who are performing work in Centennial facilities and project sites. There may be more stringent requirements than this section as defined by specific State, local or contract specific requirements. If there is a conflict between this section and other applicable regulations, the more stringent will apply.

3 Definitions

The following definitions of terms are important for an understanding of this section.

Term	Definition
Centennial	All Centennial employees, joint venture employees, subcontractors and business partners
APIC	Association for Professionals in Infection Control and Epidemiology
ASHE	American Society for Healthcare Engineering
HEPA	High-efficiency particulate air
HEPA vacuum	A vacuum cleaner which has been designed with a HEPA filter as the last filtration stage. A HEPA filter is a filter that can capture particles of 0.3 microns with 99.97% efficiency
HSEQ	Health, Safety, Environment and Quality
ICRA	Infection Control Risk Assessment
ILSM	Interim Life Safety Measures
Negative air machine	HEPA filter equipped with negative air machines that provide roughing filters, primary filters, and HEPA final filters, with a rating of 200 to 2000 cubic feet per minute (CFM).
NFPA	National Fire Protection Agency
PCRA	Pre-Construction Risk Assessment

4 Pre-Construction Risk Assessment (PCRA)

A PCRA should be conducted before any work commences in a healthcare facility (Appendix 1). If identified as necessary during the PCRA, an ICRA and/or ILSM must also be completed before work commences on project. Centennial employees and subcontractors working at a healthcare facility or other care facility where occupied by patients shall comply with the PCRA findings and are required to implement all controls and provision specified on the PCRA with no exceptions.

In many of the healthcare facilities where we work there is already an established procedure on how to administer the PCRA process. In this case we will follow the facilities' processes to include usage of their ICRA and ILSM forms.

The subcontractor's competent person must conduct frequent inspections in accordance with HSEQ Manual section 7 (Inspection, Surveillance, Audit and Monitoring) on each project site and observe potential health/safety hazards, and develop an Activity Hazard Analysis (AHA) for the elimination or reduction of risk, which may include the following elements:

- Removing the hazard when discovered
- Guarding against the hazard as required by the PCRA, ICRA and ILSM
- Providing personal protective equipment and enforcing its use
- Training employees and lower-tiered contractors in safe work practices and elements of the Centennial Continuum of Care
- Communicating newly identified risk to the healthcare facility management
- Communicating any changes in demolition, construction, or renovation due to unforeseen circumstances or conditions

5 Centennial Continuum of Care (3C's)

5.1 Centennial Continuum of Care (3C's) orientation

The purpose of the Centennial Continuum of Care (3C's) orientation is to provide awareness to all employees and subcontractor employees regarding specific health and safety hazards that may be present on healthcare project sites. This orientation is administered by a qualified Centennial representative and may be accomplished either in a local office or on the project site and must be renewed annually. To verify that subcontractor personnel have been orientated, a hardhat sticker is issued and displayed once the 3C's orientation is completed. Centennial uses a color system for the hard hat stickers to track when new subcontractor HSEQ orientations were administered. The color of the hard hat stickers are changed each year.

Specific topics covered in the 3C's orientation include but are not limited to:

- Centennial site-specific safety rules
- Progressive disciplinary procedures
- Infection Control Risk Assessment (ICRA)
- Interim/Alternative Life Safety Measures (ILSM/ALSM)
- Four leading causes of fatalities in construction
- Health hazards
 - Asbestos
 - Lead
 - Biohazards
 - Healthcare related chemicals and substances
 - Radioactive
 - Silica
 - Polychlorinated biphenyls (PCBs)
 - Mold

- Fire protection
- Hazard communication
- Incident reporting and investigation

5.2 Infection Control Risk Assessment (ICRA)

An ICRA shall be conducted before initiating repairs, demolition, construction and/or renovation activities in a healthcare facility. The ICRA will identify potential exposures of susceptible patients to dust and moisture and determine the need for dust and moisture containment measures. This assessment centers on the type and extent of the construction or repairs in the work area but may also need to include adjacent patient care areas, supply storage, and areas on levels above and below the proposed project site(s). Many healthcare facilities have an ICRA already developed and this should be used in most cases.

The ICRA is a multidisciplinary, organizational, documented process that:

- Focuses on reduction of risk from infection
- Acts through phases of facility planning, design, construction, renovation and facility maintenance
- Coordinates and weighs knowledge about infection, infectious agents, and the specific jobsite in coordination with the healthcare environment
- Anticipate potential patient impacts

5.2.1 ICRA design

The design phase of the ICRA requires extensive pre-planning for construction activities conducted within or on healthcare facilities.

Considerations include, but are not limited to:

- Number, location, and type of airborne infection isolation and protective environment rooms
- Location of special ventilation and filtration such as emergency department waiting and intake areas
- Air handling and ventilation needs in:
 - Surgical service areas
 - Airborne infection isolation and protective environment rooms
 - Laboratories
 - Local exhaust systems for hazardous agents
 - Other special areas
- Water systems to limit waterborne pathogens
- Finishes and surfaces

5.2.2 ICRA construction planning

The ICRA considers the facility itself, its construction and project site area(s) anticipated to be potentially affected by construction and shall include consideration of the following:

- Impact of disrupting essential services to patients, facility employees and other potentially affected personnel
- Determination of the specific hazards and protection levels for each
- Location of patients who may be potentially susceptible to infection and increased risk
- Impact of potential utility outages or emergencies and protection of patients during planned or unplanned outages
- Movement of debris and construction materials
- Traffic flow
- Project site cleanup frequency and methods
- Assessment of external as well as internal construction activities

5.2.3 Infection control risk mitigation

The mitigation recommendations from the ICRA shall address the following:

- Patient placement and relocation
- Work hours that may affect different groups of patients or staff
- Standards for barriers and other protective measures required to protect adjacent areas and susceptible patients from airborne contaminants
- Temporary provisions or phasing for construction or modification of heating, ventilating, air conditioning and water supply systems
- Protection from demolition
- Measures taken to train hospital staff, visitors and construction personnel in the specific tasks, activities and project site location(s) that may affect patients or others

The final phase of the ICRA includes specific inspection guidance of the facility for infection control measures and continuous monitoring of their effectiveness throughout the project to assure acceptable levels of infectious control during construction.

When developing the infection control risk mitigation measures, one should use the following six step process as identified by ASHE.

5.2.4 ICRA matrix step 1

Use the table below to identify the type of construction project.

Construction and Renovation Activity Types	
Construction Type	Description
A	Inspections and non-invasive activities. Includes but is not limited to: - Removal of ceiling tile for visual inspection-limited to 1 tile per 50 square feet with limited exposure time. - Limited building system maintenance (e.g. pneumatic tube station, HVAC system, fire suppression system, electrical and carpentry work to include painting without sanding) that does not create dust or debris. - Clean plumbing activity limited in nature.
B	Small scale, short duration activities, that create minimal dust and debris. Includes, but is not limited to: - Work conducted above the ceiling {e.g.. prolonged inspection or repair of firewalls and barriers, installation of conduit and/or cabling, and access to mechanical and/or electrical chase spaces}. - Fan shutdown/startup - Installation of electrical devices or new flooring that produces minimal dust and debris. - The removal of drywall where minimal dust and debris is created. - Controlled sanding activities (e.g. wet or dry sanding) that produce minimal dust and debris.
C	Large-scale, longer duration activities that create a moderate amount of dust and debris. Includes, but is not limited to: - Removal of pre-existing floor covering, walls, casework or other building components. - New drywall placement. - Renovation work in a single room. - Non-existing cable pathway or invasive electrical work above ceilings. - The removal of drywall where a moderate amount of dust and debris is created. - Dry sanding where a moderate amount of dust and debris is created. - Work creating significant vibration and/or noise. - Any activity that cannot be completed in a single work shift.
D	Major demolition and construction activities. Includes, but is not limited to: - Removal or replacement of building system component(s). - Removal/installation of drywall partitions. - Invasive large-scale new building construction. - Renovation work in two or more rooms.

5.2.5 ICRA matrix step 2

Centennial will utilize the ASHE ICRA 2.0 matrix promoted by the Association for Professionals in Infection Control and Epidemiology (APIC) and the American Society for Healthcare Engineering (ASHE) to categorize patients per group within a specific patient population. The development of the "patient risk groups" is quite relative and often determined by the specific healthcare facility and the criteria are dependent on the facility's composition and location of patients.

Use the table below to identify the patient of facility occupant risk group that will be affected.

Infection Control Risk Assessment (ICRA) Patient Risk Groups	
Construction Type	Description
Group 1 Lowest Risk Non-patient care areas	▪ Public hallways and gathering areas not on clinical units ▪ Office areas not on clinical units ▪ Breakrooms not on clinical units ▪ Bathrooms or locker rooms not on clinical units ▪ Mechanical rooms not on clinical units ▪ EVS closets not on clinical units
Group 2 Medium Risk Patient care support areas	▪ Waiting areas ▪ Clinical engineering ▪ Materials management ▪ Sterile processing department – dirty side ▪ Kitchen, cafeteria, gift shop, coffee shop, and food kiosks
Group 3 High Risk Patient care areas	▪ Patient care rooms and areas ▪ All acute care units ▪ Emergency department ▪ Employee health ▪ Pharmacy – general work zone ▪ Medication rooms and clean utility rooms ▪ Imaging suites: diagnostic imaging ▪ Laboratory
Group 4 Highest Risk Procedural, invasive, sterile support and highly compromised patient care areas	▪ All transplant and intensive care units ▪ All oncology units ▪ OR theaters and restricted areas ▪ Procedural suites ▪ Pharmacy compounding ▪ Sterile processing department – clean side ▪ Transfusion services ▪ Dedicated isolation wards/units ▪ Imaging suites: invasive imaging

5.2.6 ICRA matrix step 3

Using the matrix below, match the Construction Type from step one and the Patient Risk Group from step two to find the level of infection control activities required. These activities are listed in Table 5 – Minimum Required Infection Control Precautions by Class.

Patient Risk Group	Construction Project Type			
	Type A	Type B	Type C	Type D
Low Risk Group	I	II	II	III*
Medium Risk Group	I	II	III*	IV
Medium-High Risk Group	I	III	IV	V
Highest Risk Group	III	IV	V	V

* Type C (Medium Risk Groups) and Type D (Low Risk Groups) work areas (Class III precautions) that cannot be sealed and completely isolated from occupied patient care spaces should be elevated to include negative air exhaust requirements as listed in the Class IV precautions.

5.2.7 ICRA Matrix Step 4

Step 4 assess the potential risks to areas surrounding the project for hazards such as

- Noise
- Vibration
- Dust control
- Ventilation
- Pressurization
- Vertical Shafts
- Elevators/Stairs

In order to mitigate the risks certain noise and vibration mitigation strategies can be employed:

- Use diamond drills instead of powder-actuated fasteners.
- Schedule noise-making periods with adjacent spaces.
- Use beam clamps instead of shot.
- Prefab where possible.
- Use tin snips to cut metal studs instead of using a chop saw.
- Install metal decking with vent tabs, then use cellular floor deck hangers.
- Consider compression style fittings instead of soldering, brazing or welding.
- Wet core drill instead of dry core or percussion.
- Instead of jackhammering concrete, use wet diamond saws.
- Use HEPA vacuums instead of standard wet/dry vacuums.
- Use mechanical joining system sprinkler fittings instead of threaded.
- Where fumes are tolerated, use chemical adhesive remover (flooring glue) instead of mechanical.
- To remove flooring, consider abrasive blasting instead of using a floor scraper.
- Use electric sheers instead of reciprocating saw for ductwork cutting.
- Install exterior man/material lifts.

Ventilation and Pressurization Mitigation Strategies:

- HEPA to exterior
- Install temporary ductwork
- Utilize temporary HVAC equipment
- Vacate the area
- Install temporary partitions
- Use carbon filtration to filter odors

Other Systems mitigation strategies

- Schedule outages
- Provide temporary systems
- Back-feed electricity or medical gases

5.2.8 ICRA Matrix Step 5

From Step 3, the minimum required infection control precaution by class before and during work is as follows:

Class I

- Perform non-invasive work activity as to not block or interrupt patient care.
- Perform non-invasive work activities in areas that are not directly occupied with patients.
- Perform non-invasive work activity in a manner that does not create dust.
- Immediately replace any displaced ceiling tile before leaving the area and/or at end of non-invasive work activity.

Class II

- Perform only limited dust work and/or activities designed for basic facilities and engineering work.
- Perform limited dust and invasive work following standing precautions procedures approved by the organization.
- This Class of Precautions must never be used for construction or renovation activities.

Class III

- Provide active means to prevent airborne dust dispersion into the occupied areas.
- Means for controlling minimal dust dispersion may include hand-held HEPA vacuum devices, polyethylene plastic containment, or isolation of work area by closing room door.
- Remove or isolate return air diffusers to avoid dust from entering the HVAC system.
- Remove or isolate the supply air diffusers to avoid positive pressurization of the space.
- If work area is contained, then it must be neutrally to negatively pressurized at all times.
- Seal all doors with tape that will not leave residue.
- Contain all trash and debris in the work area.
- Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area.
- Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled.
- Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces.

Class IV

- Construct and complete critical barriers meeting NFPA 241 requirements including: Barriers must extend to the ceiling or, if ceiling tile is removed, to the deck above, and all penetrations through the barrier shall meet the appropriate fire rating requirements.
- All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor.
- Seal all penetrations in containment barriers, including floors and ceiling, using approved materials (UL schedule firestop if applicable for barrier type).

- Containment units or environmental containment units (ECUs) approved for Class IV precautions in small areas totally contained by the unit and that has HEPA-filtered exhaust air.
- Remove or isolate return air diffusers to avoid dust entering the HVAC system.
- Remove or isolate the supply air diffusers to avoid positive pressurization of the space.
- Negative airflow patterns must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized.
- Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows do not require HEPA-filtered air.
- If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas.
- Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable.
- Install device on exterior of work containment to continually monitor negative pressurization. To ensure proper pressure is continuously maintained, it is recommended that the device(s) have a visual pressure indicator.
- Contain all trash and debris in the work area.
- Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area.
- Worker clothing must be clean and free of visible dust before leaving the work area. HEPA vacuuming of clothing or use of cover suits is acceptable.
- Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed.
- Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled.
- Consider collecting particulate data during work to monitor and ensure that contaminants do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.

Class V

- Construct and complete critical barriers meeting NFPA 241 requirements including: Barriers must extend to the ceiling, or if ceiling tile is removed, to the deck above, and all penetrations through the barrier shall meet the appropriate fire rating requirements.
- All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor.
- Seal all penetrations in containment barriers, anteroom barriers, including floors and ceiling using approved materials (UL schedule firestop if applicable for barrier type).
- Construct anteroom large enough for equipment staging, cart cleaning, workers. The anteroom must be constructed adjacent to entrance of construction work area.
- Personnel will be required to always wear disposable coveralls during Class V work activities. Disposable coveralls must be removed before leaving the anteroom.

- Remove or isolate return air diffusers to avoid dust entering the HVAC system.
- Remove or isolate the supply air diffusers to avoid positive pressurization of the space.
- Negative airflow patterns must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized.
- Maintain negative pressurization of the entire workspace using HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows do not require HEPA-filtered air.
- If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas.
- Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (bathroom exhaust) is not acceptable.
- Install device on exterior of work containment to continually monitor negative pressurization. To ensure proper pressure is continuously maintained, it is recommended that the device(s) have a visual pressure indicator.
- Contain all trash and debris in the work area.
- Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area.
- Worker clothing must be clean and free of visible dust before leaving the work area anteroom.
- Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed.
- Install an adhesive (dust collection) mat at entrance of contained work area based on facility policy. Adhesive mats must be changed routinely and when visibly soiled.
- Consider collecting particulate data during work to monitor and ensure that contaminants do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies.

5.2.9 ICRA Matrix Step 6

The minimum required infection control precautions upon completion are as follows:

Classes I, II and III

Cleaning:

- Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials.
- Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.

HVAC Systems:

- Remove isolation of HVAC system in areas where work is being performed. Verify that HVAC systems are clean and operational.
- Verify the HVAC systems meet original airflow and air exchange design specifications.

Classes III, IV and V

Class III (Type C Activities only), IV, and V precautions require inspection and documentation for downgraded ICRA precautions.

Construction areas must be inspected by an infection preventionist or designer and engineering representative for discontinuation or downgrading of ICRA precautions.

Work Area Cleaning:

- Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials.
- Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.

Removal of Critical Barriers:

- Critical barriers must remain in place during all work involving drywall removal, creation of dust and activities beyond simple touch-up work. The barrier may NOT be removed until a work area cleaning has been performed.
- All (plastic or hard) barrier removal activities must be completed in a manner that prevents dust release. Use the following precautions when removing hard barriers:
 - i. Carefully remove screws and painter tape.
 - ii. If dust will be generated during screw removal, use hand-held HEPA vacuum.
 - iii. Drywall cutting is prohibited during removal process.
 - iv. Clean all stud tracks with HEPA vacuum before removing outer hard barrier.
 - v. Use a plastic barrier to enclose area if dust could be generated.

Negative Air Requirements:

- The use of negative air must be designed to remove contamination from the work area.
- Negative air devices must always remain operational and in place for a period after completion of dust creating activities to remove contaminants from the work area and before removal of critical barriers.

HVAC systems:

- Upon removal of critical barriers, remove isolation of HVAC system in areas where work is being performed.
- Verify that HVAC systems are clean and operational.
- Verify the HVAC systems meets original airflow and air exchange design specifications.

5.3 Interim Life Safety Measures (ILSM)/ Alternative Life Safety Measures (ALSM)

Construction or maintenance activities may have an impact on the life safety systems in the healthcare facility, thus requiring an interim plan to address the hazards created by the work activity. Interim Life Safety Measures (ILSM) or Alternative Life Safety Measures (ALSM) are health and safety measures that are put in place to protect the safety of patients, visitors, staff and other affected personnel who are occupying the facility.

This may include impact to the following life safety systems and components:

- Exit signs and pathways to an egress point
- Fire protection systems including smoke detectors
- Fire suppression
- Fire extinguishers and fire alarm systems
- Smoke barriers
- Emergency evacuation plans

The intent of the development of these interim measures is to provide a level of life safety comparable to that described in the National Fire Protection Association Life Safety Code (NFPA 101).

Life safety deficiencies of the healthcare facility shall be reviewed and assessed according to the degree that a particular deficiency affects the facility's overall fire safety features. ILSM/ALSM shall be coordinated by the Centennial project superintendent with coordination from the healthcare facilities management team and the local fire department (as necessary).

The life safety deficiencies can be categorized as follows:

- Level I - A deficiency or series of deficiencies that indicate a lack of proper maintenance of building components
- Level II - A deficiency or series of deficiencies that may threaten life, and its scope of deficiency is significant in a limited area
- Level III - A deficiency or deficiencies indicating pervasive life safety violation and the scope of deficiency is such that correction of the deficiencies will take significant periods of time

The criteria to evaluate construction deficiencies and to determine when and to what extent one or more measures are applicable or are appropriate for a particular construction project, phase of construction, or deficiency may include but not be limited to construction activities that:

- Alter or compromise the integrity of exit access, exit or exit discharge features
- Significantly compromise the integrity of the building's compartmentation features such as fire barriers, smoke barriers, floor slabs, corridor walls, etc.
- Impair the building's fire alarm, fire detection or fire suppression systems
- Involve temporary sources of ignition such as cutting, welding, torch operations or other "hot work" operations
- Involve the presence of large quantities of combustible or flammable materials and/or debris

5.4 Dust mitigation

All possible efforts shall be made by subcontractors to limit the amount of dust created and released at the job site and in the surrounding areas. Dust from construction, demolition and/or renovation may contain bacteria, viruses, molds, spores, pathogens and various other items that have the potential to cause life threatening illness in a healthcare facility's immune compromised patients and shall be prevented or limited.

Dust mitigation activities include:

- Removing debris from site in clean covered bins
- Removing debris from site at specified times or specific routes if deemed necessary in the ICRA
- Use and regular replacement of adhesive walk off mats at entrances and exits to site
- Wet mopping or HEPA vacuuming area around entrance and exit of site as needed
- Water-misting work surfaces to control dust disturbance during work as needed
- Sealing all penetrations into/out of site (around piping and keep windows closed)
- Sealing all temporary partitions to prevent dust escape
- Wiping tools down before removal from site
- Planning ahead to limit number of entrances and exits from site
- Using negative air machines in high dust generating sites
- Removing dust from clothes before leaving site or using disposable garments that are removed prior to exiting the project site as needed

6 Training

Centennial employees managing healthcare projects should be properly trained on the unique aspects of this work. ASHE provides a one-day course to qualify health care physical environment workers. In addition, staff working in the healthcare environment should achieve the Healthcare Construction Certificate (HCC), and the Certified Healthcare Constructor (CHC) certification.

Due to the unique risk posed by construction work in healthcare facilities, all subcontractors shall complete the Centennial Continuum of Care Program in addition to the Centennial New Subcontractor Orientation Program as discussed in HSEQ Manual section 6 (HSEQ Risk Assessment and Operations).

The Centennial Continuum of Care program includes:

- Focus on the unique hazards of healthcare construction
- Infection Risk Control Assessment (ICRA)
- Interim life safety policies and procedures specific to the healthcare environment

7 Amendment history

Date	Version	Revised content
10.04.2014	1.0	Initial Preparation
03.01.2015	1.1	Addition of paragraph 5.1- Centennial Continuum of Care (3C's) orientation
12.06.2016	1.2	Frequency for renewal of 3C's orientation updated to annual renewal
05.23.2017	1.3	Revision to Appendix 19/1 PCRA and Paragraph 5.2.6 to include surrounding area risk
01.01.2018	2.0	Updates to Paragraph 2 Superior Documents to add the Group Policy and Global Standards, Paragraph 3 Definitions (Centennial), Paragraph 4 Pre-Construction Risk Assessment (client processes and forms), Paragraph 5.2 Infection Control Risk Assessment (client processes and forms) and Appendix 1 (logo)
04.01.2021	2.1	Updates to Paragraph 2 Superior Documents, Paragraph 5.1 to replace Mercury with Silica, Paragraph 5.2.6 to clarify barriers and Appendix 1.5 to replace Mercury with Silica
09.01.2026	2.2	Updates to Paragraph 2 Superior Documents, Paragraph 5.1 (updated 3Cs training instructor), Paragraph 5 (ASHE ICRA 2.0), Paragraph 6 (certification updates), and Appendix 1 (ASHE ICRA 2.0)

8 Appendix

Appendix 1: Pre-Construction Risk Assessment (0206500_CP_11_19_en_A1.6)

Pre-Construction Risk Assessment

0206500_CP_11_19_en_A1.6

Instructions: Complete the Pre-Construction Risk Assessment form below. This form is required for all healthcare projects including, but not limited to, COMPASS Market Segment H (Healthcare) and VA (Veterans Affairs). Indicate your response using a Yes - No - N/A or check box format. If more explanation is required, use the spaces provided.

Project Information

Project Title: _____ Contract #: _____

Project Location: _____ Project Start Date: _____

Project Duration: _____ Project Manager: _____

Project Superintendent: _____ Project Safety Officer: _____

Subcontractor(s): _____

Scope of Work (brief description): _____

Applicable Risk Assessment Elements

- | | |
|--|--|
| ☐ Life safety code deficiencies (ILSM / ALSM) | ☐ Utility Interruptions / impacts |
| ☐ Air quality / pressure management (ICRA) | ☐ Noise and vibration |
| ☐ Environmental services requirements | ☐ Security |
| ☐ Other safety hazards (explain): _____ | |

Note: attach a drawing showing the locations of the following: barrier type, entrances, negative air unit(s) and discharge and pressure monitor type

Life Safety Code / Fire Safety Deficiencies

☐ Yes ☐ No EXITS - Does the project have the potential of affecting a required exit or other means of egress?
If yes, identify interim measure to be taken:

☐ Yes ☐ No EXITS - Would the affected exit be used by anyone other than construction staff?
If yes, identify interim measures to be taken:

☐ Yes ☐ No EMERGENCY ACCESS - does the project have the potential for obstructing access?
If yes, identify interim measures to be taken:

☐ Yes ☐ No

EMERGENCY RESPONDERS - does the project have the potential for obstructing access of emergency response staff to the construction area? If yes, identify interim measures to be taken:

☐ Yes ☐ No

FIRE PROTECTION - will the project activity affect the fire detection system? If yes, identify interim measures to be taken:

☐ Yes ☐ No

FIRE PROTECTION - will the project activity require additional fire fighting equipment? If yes, identify interim measures to be taken:

☐ Yes ☐ No

FIRE RESPONSE TRAINING - does the project activity require that staff receive additional fire fighting equipment training? If yes, identify interim measures to be taken:

☐ Yes ☐ No

COMBUSTIBLE LOAD - will the project require the storage of flammable or combustible material(s)? If yes, identify interim measures to be taken:

☐ Yes ☐ No

TEMPORARY PARTITIONS - will the project require temporary partitions? (partitions are to be smoke tight and of limited combustible materials) If yes, identify interim measures to be taken:

☐ Yes ☐ No

FIRE DRILLS - does the project warrant additional fire drills? If yes, identify interim measures to be taken:

☐ Yes ☐ No

IMPACT ON RATED STRUCTURES - will project plans/activities affect structural features impacting fire protection such as rated doors or walls? If yes, identify interim measures to be taken:

☐ Yes ☐ No

HAZARD SURVEILLANCE - will the project require increased hazard surveillance inspections? If yes, identify interim measures to be taken:

Indicate inspection frequency:

☐

Daily

☐

Weekly

☐

Monthly

☐ Yes ☐ No

HOT WORK - Is hot work to be conducted in support of the project?
If yes, identify interim measures to be taken:

☐ Yes ☐ No

ENERGIZED WORK - energized work to be conducted in support of the project? If yes, please submit a completed Energized Work Permit and Job Planning/Briefing Checklist for approval.

☐ Yes ☐ No

AREA POSTING - Interim/Alternative Life Safety Measures sign posting required in the area?
If yes, identify interim measures to be taken:

☐ Yes ☐ No

FIRE/SMOKE WALL PENETRATION - will project plans/activities compromise fire/smoke wall?
If yes, identify interim measures to be taken:

FIRE WATCH - In addition, regardless of project involvement, any time the fire detection or suppression system or a portion of it is impaired or shut down for more than 4 hours in a 24 hour period, the authority having jurisdiction shall be notified and the building shall be evacuated or an approved fire watch shall be provided for all parties left unprotected by the shutdown until the fire alarm system has been returned to service. (NFPA 101-2012 9.6.1.6)

A fire watch should at least involve some special action beyond normal staffing, such as assigning an additional security guard(s) to walk the areas affected. Such individuals should be specially trained in fire prevention and in occupant and fire department notifications techniques and they should understand the particular fire safety situation for public education purposes. (NFPA 101-2012 A.9.6.1.6)

Infection Control Risk Assessment

Construction / Renovation Activity / Risk Group Worksheet - Indicate the type of work involved by placing a check mark next to the applicable response:

☐ **Type A** (Inspections and Non-invasive activities) - Includes activities that do not generate dust or require cutting of wall, drilling, sanding or access to ceilings other than for visual inspection such as:

☐ Yes ☐ No

Removal of ceiling tiles for visual inspection (1 tile per 50 SF w/limited exposure time)

☐ Yes ☐ No

Limited building system maintenance (Fire suppression, electrical/carpentry/Painting not creating dust)

☐ Yes ☐ No

Clean plumbing activity limited in nature.

☐ **Type B** (Small scale, short duration activities which will only create minimal dust) - Includes, but is not limited to:

☐ Yes ☐ No

Above ceiling work (inspection/repair of firewalls and barriers, conduit/cabling, access to chase spaces)

☐ Yes ☐ No

Fan shutdown/start up, installation of elec. devices that produce minimal dust and debris

☐ Yes ☐ No

Removal of drywall, controlled sanding activities (wet or dry) where minimal dust/debris is created

☐ **Type C** (Large-scale, longer duration activities that create a moderate amount of dust and debris). Includes but is not limited to:

- | | | |
|------------------------------|-----------------------------|---|
| ☐ Yes | ☐ No | Dry sanding where a moderate amount of dust is created |
| ☐ Yes | ☐ No | Removal of floor coverings, ceiling tiles, casework, and other building components |
| ☐ Yes | ☐ No | New drywall placement, dry sanding creating a moderate amount of dust and debris |
| ☐ Yes | ☐ No | Minor ductwork or electrical work above ceilings including major cabling activities |
| ☐ Yes | ☐ No | Work creating significant vibration and/or noise |
| ☐ Yes | ☐ No | Work in a single room, or any activity which cannot be completed within a single work shift |

☐ **Type D** (Any project that requires major demolition and/or major re-construction, extended over several days, in two or more rooms). Includes but is not limited to:

- | | | |
|------------------------------|-----------------------------|--|
| ☐ Yes | ☐ No | Removal or replacement of building system components |
| ☐ Yes | ☐ No | Removal/Installation of drywall partitions |
| ☐ Yes | ☐ No | Invasive large-scale new building construction |

Construction / Renovation Activity / Risk Group Worksheet - Indicate the type of work involved by placing a check mark next to the applicable response:

☐ **Group 1 - Low risk group (non-patient care areas)**

- | | | |
|------------------------------|-----------------------------|---|
| ☐ Yes | ☐ No | Office areas, lobbies, non-patient corridors - not on clinical units |
| ☐ Yes | ☐ No | Facility support (i.e., breakrooms, bathrooms, mechanical rooms, EVS closets) - not on clinical units |
| ☐ Yes | ☐ No | Non-patient care areas not included in groups 2, 3 or 4 |

☐ **Group 2 - Medium risk group (patient care support areas)**

- | | | |
|------------------------------|-----------------------------|--|
| ☐ Yes | ☐ No | Waiting areas |
| ☐ Yes | ☐ No | Clinical engineering |
| ☐ Yes | ☐ No | Materials Management |
| ☐ Yes | ☐ No | Sterile processing department (dirty side) |
| ☐ Yes | ☐ No | Kitchen, cafeteria, gift shop, coffee shop and food kiosks |

☐ **Group 3 - High risk group (patient care areas)**

- | | | | | | |
|------------------------------|-----------------------------|------------------------------|------------------------------|-----------------------------|--|
| ☐ Yes | ☐ No | Patient care rooms and areas | ☐ Yes | ☐ No | Pharmacy – general work zone |
| ☐ Yes | ☐ No | All acute care units | ☐ Yes | ☐ No | Medication rooms / clean utility rooms |
| ☐ Yes | ☐ No | Emergency department | ☐ Yes | ☐ No | Imaging suites: diagnostic imaging |
| ☐ Yes | ☐ No | Employee health | ☐ Yes | ☐ No | Laboratory |

☐ **Group 4 - Highest risk group (procedural, invasive, sterile support and highly compromised patient care areas)**

☐ Yes ☐ No All transplant and intensive care units

☐ Yes ☐ No All oncology units

☐ Yes ☐ No Sterile processing – clean side

☐ Yes ☐ No Transfusion services

☐ Yes ☐ No OR theaters and restricted areas

☐ Yes ☐ No Dedicated isolation wards/units

☐ Yes ☐ No Procedural suites

☐ Yes ☐ No Imaging suites: invasive imaging

☐ Yes ☐ No Pharmacy compounding

Please circle or check the appropriate construction / renovation class:

Patient Risk Group	Construction Type A	Construction Type B	Construction Type C	Construction Type D
Low Risk Group	☐ I	☐ II	☐ II	☐ III
Med Risk Group	☐ I	☐ II	☐ III*	☐ IV
High Risk Group	☐ I	☐ II	☐ IV	☐ V
Highest Risk Group	☐ III	☐ IV	☐ V	☐ V

Infection control permit and approval will be required when Class of Precautions III (type C) and all Class of Precautions IV or V are necessary.

Environmental conditions that could affect human health, such as sewage, mold, asbestos, gray water and black water will require Class of Precautions IV for LOW and MEDIUM Risk Groups and Class of Precautions V for HIGH and HIGHEST Risk Groups.

*Type C and Type D work areas that cannot be sealed and completely isolated from occupied patient spaces should be elevated to include negative air exhaust as listed in Class IV precautions.

Identify surrounding areas in relation to the area of work, assessing potential impact.

	Above	Below	Lateral	Lateral	Behind	Front
Identify Risk Group (Low to Highest)						
Identify Precaution Class (I to IV)						

Precautions to consider. Indicate all that are applicable:

Class I - Before and during work activities

- ☐ Communicate work details with owner's representative
- ☐ Perform noninvasive work activity as to not block or interrupt patient care, or in areas not directly occupied with patients.
- ☐ Execute work by methods to minimize creating dust from construction activities
- ☐ Immediately replace any displaced ceiling tile before leaving the area and/or at the end of noninvasive work activity

Upon completion of work activities

- ☐ Wet mop and/or HEPA vacuum before leaving the work area

Class II – Before and during work activities (Strictly designated for minor maintenance and engineering activities involving minimal dust and must never be used for construction or renovation activities)

- ☐ Perform only limited dust work and/or activities designed for basic facilities and engineering work
- ☐ Perform limited dust and invasive work following standing precautions procedures approved by the facility

Upon Completion of work activities

- ☐ Wet mop and/or HEPA vacuum before leaving the work area

Class III – Before and during work activities

Prior to beginning work

- ☐ Isolate HVAC system in work area to prevent contamination of the duct system
- ☐ Contain the work area with dust barriers
- ☐ Construct 1-hour rated sheetrock air-tight dust barriers
- ☐ Construct sheetrock air-tight barriers
- ☐ Construct poly air-tight barriers
- ☐ Install an adhesive (dust collection) mat at entrances of contained work area
- ☐ Work will be completed within a control cube
- ☐ Maintain negative air pressure within work area
- ☐ Air to be discharged outside of the building
- ☐ Air will be re-circulated outside of the contained work area/within the building using HEPA filtration
- ☐ Provide critical power circuits for negative air equipment in the event of a power loss
- ☐ Provide visual indication of negative pressure
- ☐ Post ICRA worksheets, controls list and contact information at work entrance
- ☐ Review site conditions with Owner PM, Safety, Engineering and/or Infection Control Staff
- ☐ Seal all doors with tape that will not leave residue
- ☐ Clean waste containers, including wheels and hard cover, prior to leaving the work area
- ☐ Monitor and record negative pressure readings daily
- ☐ Inspect dust barriers daily, record condition
- ☐ New ventilation systems are to be protected from construction dust until work is completed

Upon completion of work activities

- ☐ Do not remove barriers from work area until completed project is thoroughly cleaned by Environmental Services Department
- ☐ Review site conditions with Owner PM, Safety, Engineering and/or Infection Control Staff before removing dust barriers
- ☐ Remove barrier materials carefully to minimize spreading of dirt and debris associated with construction

Other (explain):

Class IV & V (in addition to items identified for Class I, II & III work)

Prior to beginning work

- ☐ Construct anteroom and require all personnel to pass through this room as they enter and leave the work area. Anterooms will have a negative pressure relationship with the non-construction, adjacent areas.
- ☐ Staff will be vacuumed clean prior to leaving the anteroom
- ☐ Staff will wear cloth or paper coveralls that are removed each time they exit the work site
- ☐ All personnel entering work site are required to wear shoe covers

During Work

- ☐ Provide visual indication of negative pressure (manometer readings recorded)

Upon Completion of Work (*no additional requirements*)

Other (explain): _____

Utility Interruption / Impacts

During the course of the project activities, are any of the following items likely to be interrupted or impacted in any area outside of the designated work area? (Choose all that apply. If left blank, then No or N/A is implied):

- | | | |
|---|---|---|
| ☐ Water supply | ☐ Oxygen | ☐ Fire Sprinkler |
| ☐ Sewer service | ☐ Nurse call system | ☐ Fire Alarm |
| ☐ Roof / Storm Drain | ☐ Building automation system | ☐ Steam |
| ☐ Normal power | ☐ Pneumatic tube system | ☐ Chilled water |
| ☐ Emergency power | ☐ Overhead paging system | ☐ Natural gas |
| ☐ Ventilation system | ☐ Medical gas/vacuum | ☐ Elevator(s) |
| ☐ Medical air | ☐ Other (explain): _____ | |

For any of the systems where interruptions are foreseen, please explain the steps which will be taken to mitigate the impacts (use space below):

Document any preventative measures taken to ensure that no unplanned interruption will occur (use space below):

Noise and Vibration Assessment

List any activities that will generate noise and/or vibration likely to be disruptive (use space below):

Time / Duration: _____

List mitigation strategies (use space below):

Environmental

Person(s) responsible for daily cleaning inside the work area: _____

☐ Yes ☐ No

Is terminal cleaning required at the end of the day? If yes, list person(s) responsible below:

☐ Yes ☐ No

Are there any special needs required for terminal cleaning at the end of each project? If yes, use space below to explain:

Security

Will personnel be working in a security sensitive area? (if yes, check all that apply below. If left blank, No or N/A is implied)

☐ Women's services (OB, L&D, Nursery)

☐ Cashier's office

☐ Emergency department

☐ Radiation area

☐ Psychiatry

☐ IT control room

☐ Medical records

☐ Key control area

☐ Pharmacy

☐ Other (list): _____

Additional recommendations to reduce/mitigate risk for this work (use space below):

Safety Hazards

Provide a list of any hazardous materials / chemicals used or stored within the project area (use space below):

☐ Yes ☐ No Is the work likely to generate any noxious or unusual odors? (if yes, use space below to explain steps / controls that will be implemented to control or minimize the impact):

☐ Yes ☐ No Are there any known contaminants? (if yes, place a check mark next the known or suspected contaminate and explain steps / controls that will be implemented to control or minimize the impact):

Contaminate:

Steps to minimize / eliminate impact:

☐ Asbestos	
☐ Lead	
☐ Mold	
☐ Radioactive	
☐ Biohazards	
☐ Chemicals	
☐ Silica	
☐ Polychlorinated Biphenyls	
☐ Other (explain):	

Does the planned work include any of the following? (if yes, place a check mark next the activity and explain the steps or controls that will be implemented to mitigate the risks involved. OK to reference a supplemental plan such as "confined space plan" / "fall protection plan" / etc.):

☐ Confined space entry	
☐ Lock out tag out	
☐ Scaffolding	
☐ Fall Protection	
☐ Energized work	
☐ Excavation / protective systems	

- ☐ Cranes or hoisting equipment _____
- ☐ Interruption of normal pedestrian / _____
vehicle traffic
- ☐ Other (explain): _____

Additional Comments

List any additional comments / concerns (use space below):

Approval (Signature Required)

_____	_____	_____
Project Manager (printed)	Signature	Date

Review (Signature Required)

_____	_____	_____
Centennial Representative	Signature	Date