

## SECTION 23

### Demolition, Renovation and Re-Occupancy

23.A General. The process of demolishing or renovating a structure can be completed in several ways. The terms “renovation”, “structural demolition”, “soft demolition” and mechanical demolition should be understood within the context of this section. > See Appendix Q for definitions.

23.A.02 Demolition and renovation activities shall be performed in accordance with ANSI Standard A10.6, Safety Requirements for Demolition.

a. Prior to initiating demolition or renovation activities, the following survey and plan shall be accomplished. > See *lead and asbestos requirements in Section 06.B.05.*

(1) Engineering Survey. An engineering survey by a Registered Professional Engineer (RPE) shall be performed of the structure to determine the structure layout, the condition of the framing, floors, walls, the possibility of unplanned collapse of any portion of the structure (any adjacent structure where employees or property may be exposed shall be similarly checked), and the existence of other potential or real demolition hazards.

➤ Note: The engineering survey is not required for soft demolition or renovation activities as long as no load-bearing structure will be removed or demolished.

(2) Demolition/Renovation Plan. A demolition plan developed by a RPE and shall be submitted to the GDA. Plan shall be based on the engineering, lead and asbestos surveys and shall intend for the safe dismantling and removal of all building components and debris. This plan is required for all demolition and renovation activities and shall include, but is not limited to, the following basic elements: schedule; scope of work being accomplished; description of work methods, equipment, job site and key personnel; site preparation; Waste Management Plan to include Asbestos-Containing Materials (ACM)/Other Regulated Material (ORM) Abatement Plan; Site Restoration Plan and other requirements specified in a Statement of Work or as directed by the Contracting Officer (KO).

EM 385-1-1  
XX Jul 14

b. All employees engaged in demolition/renovation activities shall be instructed in the plan so that they may conduct their work activities in a safe manner.

23.A.03 Electric, gas, water, steam, sewer, and other service lines affected as a result of project work shall be shut off, capped, or otherwise controlled inside and outside the building line before demolition is started.

a. In each case, any utility company that is involved shall be notified in advance.

b. The Contractor shall provide the GDA and the Contractor's designated authority with an engineering drawing (e.g., site plans, utility plans) that indicates the location of all service lines and the means for their control.

c. If it is necessary to maintain any power, water, or other utilities during renovation, such lines shall be temporarily relocated and protected.

d. It shall be the responsibility of the facility owner to identify and field verify the point or points for disconnection and de-energizing electrical components and electrical service lines. > See Sections 11 and 12.

(1) The Contractor must confirm that the disconnection or de-energizing has been performed prior to the start of the demolition process.

(2) De-energized electrical service shall be secured via a lock-out method and field verified by the contractor, per Section 12 and their HEC Program.

e. If the project includes the abandonment or demolition of existing gas lines, ensure that the existing lines are accurately located and that the procedures and installations for removal or replacement are accomplished in accordance with applicable sections of 29 CFR 1926.850.

f. If the project includes fire suppression systems, the owner shall provide to the GDA confirmation or verification that the Chemical Fire Suppression (CFS) system has been de-activated and that the chemical has been removed from the system prior to the start of the renovation/demolition process. If the CFS system is found to be active after demolition has begun, the contractor shall immediately cease work and notify the GDA. The contractor shall take no action to abate or remove the CFS system or components.

23.A.04 It shall be determined if any hazardous building materials, hazardous chemicals, gases, explosives, flammable materials, or dangerous substances have been used in any building construction, pipes, tanks, or other equipment on the property.

a. When such hazards are identified, testing shall be conducted to determine the type and concentration of the hazardous substance and test results shall be provided to the GDA and the Contractor's designated authority.

b. Such hazards shall be controlled or eliminated before demolition is started.

c. If Hazardous Materials (HAZMAT) are found on the project site or location after demolition has begun, the contractor shall immediately cease work and notify the GDA. The contractor shall take no action to abate or remove the HAZMAT without GDA approval.

23.A.05 All ACM and ORMs shall be removed from structures in accordance with all federal and state laws before renovation/demolition begins.

a. ACM/ORM shall be taken to a controlled landfill or other licensed disposal facility;

b. C&D shall be taken to a general waste landfill; and

c. Recyclable materials shall be taken to a recycle yard or retained by the GOV.

23.A.06 When employees work within a structure to be demolished that has been damaged by fire, flood, explosion, or other cause, the walls or floor shall be shored or braced IAW the Engineering Survey and Plan required by Section 23.A.02.

23.A.07 Work progression.

a. Except for cutting holes in floors for chutes, holes through which to drop materials, preparation of storage space, and similar preparatory work, the demolition of floors and exterior walls shall begin at the top of the structure and proceed downward.

b. Each story of exterior wall and floor construction shall be removed and dropped

EM 385-1-1  
XX Jul 14

into the storage space before commencing the removal of exterior walls and floors on the next story below.

23.A.08 Potential hazards due to the fragmentation of glass shall be considered and controlled for all persons inside and outside of the demolition site.

23.A.09 Mechanical equipment shall not be used on floors on working surfaces unless such floors or surfaces are of sufficient strength to support the imposed load.

23.A.10 Employee entrances to multistory structures being demolished shall be protected by sidewalk sheds, canopies, or both.

a. Protection shall be provided from the face of the building for a minimum of 8 ft (2.4 m).

b. All such canopies shall be at least 2 ft (0.6 m) wider than the building entrances or openings (1 ft (0.3 m) wider on each side), and shall be capable of sustaining a load of 150 psi (1,034.2 kPa).

23.A.11 Only those stairways, passageways, and ladders designated as means of access to the structure shall be used.

a. The designated means of access shall be indicated on the demolition plan. Other access ways shall be indicated as not safe for access and closed at all times.

b. The stairwell shall be covered to protect workers from falling debris at a point no less than two floors below the floor on which work is being performed.

c. Access to a floor where work is in progress shall be through a separate lighted, protected passageway.

23.A.12 During demolition, continuing inspections by a Competent Person (CP) shall detect hazards resulting from weakened or deteriorated floors, walls, or loosened material. No employee shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other means. The frequency of inspections will be identified in the blasting/renovation plan.

### 23.A.13 Debris Removal

a. Walls, or sections of masonry, shall not be permitted to fall upon the floors of the building in such masses as to exceed the safe carrying capacities of the floors.

b. Any chute opening into which debris is dumped shall be protected by a guardrail 42 in (1.1 m) above the floor or other surface on which personnel stand to dump the material. Any space between the chute and the edge of openings in the floors through which it passes shall be covered.

c. When debris is dropped through openings in the floors without chutes, the openings and the area onto which the material is dropped shall be enclosed with barricades not less than 42 in (1.1 m) high and not less than 6 ft (1.8 m) back from the projected edge of the opening above.

(1) Signs warning of the hazard of falling materials shall be posted at each side of the debris opening at each floor.

(2) Debris removal shall not be permitted in lower areas until debris handling ceases on the floors above.

d. All material chutes, or sections thereof, at an angle of more than 45° from the horizontal shall be enclosed, except for openings equipped with closures at or about floor level for the insertion of materials.

(1) The openings shall not exceed 48 in (1.2 m) in height measured along the wall of the chute.

(2) Such openings, when not in use, shall be kept closed at all floors below the top floor.

e. A substantial gate shall be installed in each chute at or near the discharge end. A competent employee shall be assigned to control operation of the gate and the backing and loading of trucks.

f. When operations are not in progress, the area surrounding the discharge end of a chute shall be closed.

EM 385-1-1  
XX Jul 14

g. Where material is dumped from mechanical equipment or wheelbarrows, a toe board or bumper, not less than 4 in (10 cm) thick and 6 in (15 cm) high, shall be attached at each chute opening.

h. Chutes shall be designed and constructed of such strength as to eliminate failure due to impact of materials or debris loaded therein.

i. The storage of waste and debris on any floor shall not exceed the allowable floor loads.

j. In buildings having wood floor construction, the floor joists may be removed from not more than one floor above grade to provide storage space for debris provided falling material is not permitted to endanger the stability of the structure.

(1) When wood floor beams serve to brace interior walls or freestanding exterior walls, such beams shall be left in place until other support can be installed to replace them.

(2) Floor arches, to an elevation of not more than 25 ft (7.6 m) above grade, may be removed to provide storage area for debris provided such removal does not endanger the stability of the structure.

(3) Storage space into which material is dumped shall be blocked off, except for openings for the removal of materials. Such openings shall be kept closed when material is not being removed.

(4) Floor openings shall have curbs or stop-logs to prevent equipment from running over the edge.

(5) Any opening cut in a floor for the disposal of materials shall be not longer in size than 25% of the aggregate of the total floor area, unless the lateral supports of the removed flooring remain in place. Floors weakened or otherwise made unsafe by demolition shall be shored to carry safely the intended imposed load for demolition.

#### 23 A.14 Debris Disposal.

a. Debris generated by demolition or contained within the facility or found within

the defined work perimeter of the facility or project shall be removed from the site as waste material, to include ACM and ORM. Debris shall be separated according to type of disposal that is required.

b. The disposal site, whether Government furnished, private, or commercial shall be approved by the GDA prior to Notice to Proceed. Contractor shall provide to the GDA documentation that confirms the disposal location, the type of debris, and quantities of each type

#### 23.A.14 Wall Removal.

a. Masonry walls, or sections of masonry, shall not be permitted to fall upon the floors of the building in such masses as to exceed the safe carrying capacities of the floors.

b. No wall section that is more than 6 ft (1.8 m) in height shall be permitted to stand without lateral bracing, unless such wall was designed and constructed to stand without such lateral support and is in a condition safe enough to be self-supporting. No wall section shall be left standing without lateral bracing any longer than necessary for removal of adjacent debris interfering with demolition of the wall.

➤ Exception: for wall sections that are designed and constructed to stand without lateral support, an exception may be allowed.

c. Employees shall not be permitted to work on the top of a wall when weather constitutes a hazard.

d. Structural or load-supporting members on any floor shall not be cut or removed until all stories above such a floor have been demolished and removed. This shall not prohibit the cutting of floor beams for the disposal of materials or for the installation of equipment, providing the requirements of Sections 23.B.09 and 23.D. are met.

e. Floor openings within 10 ft (3 m) of any wall being demolished shall be planked solid, except when employees are kept out of the area below.

f. In buildings of skeleton-steel construction, the steel framing may be left in place during the demolition of masonry. Where this is done, all steel beams, girders, and structural supports shall be cleared of all loose material as the masonry demolition progresses downward.

EM 385-1-1  
XX Jul 14

g. Walls that serve as retaining walls to support earth or adjoining structures shall not be demolished until such earth has been braced or adjoining structures have been underpinned. > See Section 23.B.04.

h. Walls shall not be used to retain debris unless capable of safely supporting the imposed load.

#### 23.A.15 Floor Removal.

a. Before demolishing any floor, debris and other material shall be removed from the immediate work location and other adjacent floor areas.

(1) Planks not less than 2-in x 10-in (5-cm x 25.4-cm) in cross section, full sized undressed, shall be provided for and shall be used by employees to stand on while breaking down floor areas between beams/joists.

(2) Such planks shall be so located as to provide a safe support for personnel should the joists between the beams collapse.

(3) Straddle space between planks shall not exceed 16 in (40.6 cm).

b. Safe walkways, not less than 18 in (45.7 cm) wide, formed of wood planks not less than 2 in (5 cm) thick or of equivalent strength, shall be provided and used by personnel when necessary to enable them to reach any point without walking upon exposed beams.

c. Stringers of ample strength shall support the flooring planks. The ends of such stringers shall be supported by floor beams or girders.

d. Planks shall be laid together over solid bearings with the ends overlapping at least 1 ft (0.3 m).

e. When floor are being removed, employees shall not be allowed in the area directly underneath. The area shall be barricaded to prevent access and signed to warn of the hazard.



#### 23.A.16 Steel Removal.

a. When a floor, or any portion of a floor, has been removed, planking shall be provided for the workers razing/dismantling the steel framing.

b. Steel construction shall be dismantled column-by-column and tier-by-tier (columns may be in two-story lengths).

c. Any structural member being dismembered shall not be overstressed.

#### **23.B. Structural Demolition.**

23.B.01 General. Removal of a facility may include the structure as well as any related appurtenances: fences, parking areas and associated lights, roadways and access from roadways, sidewalks and stairs associated with access, pads, patios, and paved lay-down areas, utilities, underground storage tank (UST)/above ground storage tank (AST), poles, interior and exterior equipment associated with the facility, interior and exterior equipment within the designated perimeter of the facility.

23.B.02 All operations involving the use of load handling equipment (LHE) shall meet Section 16 to include: Certificated of Compliance; documented personnel qualifications (operators, riggers, signal persons, others); LHE inspections, operational and load tests and certifications; and standard lift plan. If the manufacturer of the equipment does not allow the equipment to be utilized as planned, you are prohibited from performing this function.

23.B.03 No personnel shall be working within the structure once the structural demolition process has begun. Before structural demolition can begin, abatement of ACM and other regulated materials shall be done.

23.B.04 Structural demolition may include any or all of these features prior to demolition:

- a. Removal of universal waste prior to the start of facility removal;
- b. Partial demolition to expose the structure frame;
- c. Soft demolition.

EM 385-1-1  
XX Jul 14

23.B.05 Mechanical Demolition.

a. All motorized equipment used on a project shall meet requirements of the EM 385-1-1, as well as applicable OSHA requirements. In addition, see National Demolition Association's *Demolition Safety Manual*, Chapter 7.0 for further information on equipment safety.

b. No person shall be permitted in any area that can be affected by demolition when mechanical demolition is being performed. Only those persons necessary for the operations shall be permitted in this area at any other time.

c. Dust abatement measures will be used to suppress dust during demolition.

d. Operators are required to wear respirators per Section 05.

e. A demolition ball shall be used ONLY if it has been approved by GDA. If the use of a demolition ball is approved:

(1) The weight of the demolition ball shall not exceed 50% of the crane's rated load, based on the length of the boom and the maximum angle of operation at which the demolition ball will be used, or it shall not exceed 25% of the nominal breaking strength of the line by which it is suspended, whichever is less;

(2) The crane boom and load line shall be as short as possible;

(3) The ball shall be attached to the load line with a swivel-type connection to prevent twisting of the load line and shall be attached by positive means so that the weight cannot be accidentally disconnected.

(4) Continued on-going inspections by the CP shall be made as the demolition work progresses to detect hazards resulting from weakened or deteriorated floors or walls, or loosened material. No employee shall be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.