

SECTION 23

DEMOLITION

23.A GENERAL

23.A.01 Demolition activities shall be performed in accordance with ANSI Standard A10.6, Safety Requirements for Demolition.

Surveys and planning shall meet the following:

a. Prior to initiating demolition activities the following survey and plan shall be accomplished: > ***See lead and asbestos requirements in Section 6.B.05.***

(1) An engineering survey by a Registered Professional Engineer (RPE) 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.

(2) A demolition plan - by a RPE and based on the engineering and lead and asbestos surveys - for the safe dismantling and removal of all building components and debris.

b. The GDA and the Contractor's designated authority shall be provided written evidence that the required surveys have been performed and shall be provided a copy of the demolition plan.

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

23.A.02 All electric, gas, water, steam, sewer, and other service lines shall be shut off, capped, or otherwise controlled outside the building line before demolition is started.

EM 385-1-1

15 Sep 08

- 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 demolition, such lines shall be temporarily relocated and protected.
- d. If the project includes the abandonment or demolition of existing gas lines, ensure that the existing lines are accurately located and that procedures and installations are accomplished in accordance with applicable sections of 29 CFR 1926.850.

23.A.03 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.

23.A.04 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.

23.A.05 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 into the storage space before commencing the removal of exterior walls and floors in the next story below.

23.A.06 Hazards to anyone from the fragmentation of glass shall be controlled.

23.A.07 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.08 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.09 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 at a point no less than two floors below the floor on which work is being performed.

EM 385-1-1
15 Sep 08

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

23.A.10 During demolition, continuing inspections by a competent person 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.

23.B DEBRIS REMOVAL

23.B.01 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.

23.B.02 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.

- a. Signs warning of the hazard of falling materials shall be posted at each side of the debris opening at each floor.
- b. Debris removal shall not be permitted in lower areas until debris handling ceases on the floors above.

23.B.03 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.

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

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

23.B.04 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.

23.B.05 When operations are not in progress, the area surrounding the discharge end of a chute shall be closed.

23.B.06 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.

23.B.07 Chutes shall be designed and constructed of such strength as to eliminate failure due to impact of materials or debris loaded therein.

23.B.08 The storage of waste and debris on any floor shall not exceed the allowable floor loads.

23.B.09 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.

a. When wood floor beams serve to brace interior walls or free-standing exterior walls, such beams shall be left in place until other support can be installed to replace them.

b. 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.

c. Storage space into which material is dumped shall be blocked off, except for openings for the removal of materials.

EM 385-1-1
15 Sep 08

Such openings shall be kept closed when material is not being removed.

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

e. 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.C WALL REMOVAL

23.C.01 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.

23.C.02 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 to this requirement will be allowed for such wall sections that are designed and constructed to stand without lateral support.

23.C.03 Employees shall not be permitted to work on the top of a wall when weather constitutes a hazard.

23.C.04 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 23.B.09 and 23.D. are met.

23.C.05 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.

23.C.06 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.

23.C.07 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 23.A.05.**

23.C.08 Walls shall not be used to retain debris unless capable of safely supporting the imposed load.

23.D FLOOR REMOVAL

23.D.01 Openings cut in a floor shall extend the full span of the arch between supports.

23.D.02 Before demolishing any floor arch, debris and other material shall be removed from such arch and other adjacent floor area.

a. 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 arches between beams.

b. Such planks shall be so located as to provide a safe support for personnel should the arch between the beams collapse.

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

EM 385-1-1
15 Sep 08

23.D.03 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.

23.D.04 Stringers of ample strength shall support the flooring planks. The ends of such stringers shall be supported by floor beams or girders and not by floor arches alone.

23.D.05 Planks shall be laid together over solid bearings with the ends overlapping at least 1 ft (0.3 m).

23.D.06 When floor arches 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.E STEEL REMOVAL

23.E.01 When floor arches have been removed, planking shall be provided for the workers razing the steel framing.

23.E.02 Steel construction shall be dismantled column-by-column and tier-by-tier (columns may be in two-story lengths).

23.E.03 Any structural member being dismembered shall not be overstressed.

23.F MECHANICAL DEMOLITION

23.F.01 No person shall be permitted in any area that can be affected by demolition when balling or clamming is being performed. Only those persons necessary for the operations shall be permitted in this area at any other time.

23.F.02 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.

23.F.03 The crane boom and load line shall be as short as possible.

23.F.04 The ball shall be attached to the load line with a swivel connection to prevent twisting of the load line and shall be attached by positive means so that the weight cannot accidentally disconnect.

23.F.05 When pulling over walls or portions of walls, all steel members affected shall have been cut free.

23.F.06 All roof cornices or other ornamental stonework shall be removed prior to pulling walls over.

EM 385-1-1
15 Sep 08

BLANK