IS 4130 : 1991
(Reaffirmed 1996)

भारतीय मानक

भवनों को तोड़ने के लिये सुरक्षा संहिता

(दूसरा पुनरीक्षण)

Indian Standard

DEMOLITION OF BUILDINGS — CODE OF SAFETY

(Second Revision)

UDC 69·059·6 : 614·8

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 1991

Price Group 5

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Safety in Construction Sectional Committee had been approved by the Civil Engineering Division Council.

Demolition of any structure is, inherently, more hazardous than the construction or erection of the same. From the point of view of safety, the conditions usually encountered while dismantling a structure, whatever its magnitude, do not lend themselves to the degree of control possible in construction operations, where more stable conditions are generally obtainable. It is all the more imperative, therefore, that adequate attention is given to the planning and the execution of demolition work, its various stages, so as to minimize the risk of accidents and injuries to the personnel engaged on demolition operations. Adoption of predetermined and well-planned safety measures for demolition work will not only prevent accidents but also will increase all-round efficiency.

Generally, the time available and the equipment possible to obtain are the elements limiting the application of strict safety rules; but these should not, in any case, be allowed to endnager the safety of human life or limbs. Although, everyone incharge of a demolition work is always desirous of preventing accidents, lack of readily available systematic procedures or rules, observance of which will ensure safety in demolition operation, has sometimes led to dangerous situations and actual accidents.

It has, therefore, become imperative that certain safety rules are laid down for the guidance of those who are engaged in demolition work, so that they may be meticulously followed.

Safety cannot be ensured solely through regulations. It is desirable to have a planned programme and secure adequate cooperation of managements, supervisors and workers, involved in the work.

This standard was first published in 1967 and subsequently revised in 1976. The present revision has been taken up based on the experience gained with the use of this standard. In this revision the details of removal of debris/*malba* from demolition site have been incorporated in addition to some other minor changes.

In the formulation of this standard due weightage has been given to international coordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

For the purpose of deciding whether a particular requirement of this standard, is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

DEMOLITION OF BUILDINGS — CODE OF SAFETY

(Second Revision)

1 SCOPE

This standard lays down the safety requirements for carrying out safely the demolition/dismantling of all types of buildings, for example, residential building (load-bearing structure, multistoreyed framed structures), public buildings and factories.

2 REFERENCES

The Indian Standards listed below are necessary adjuncts to this standard:

IS No.	*Title*
IS 2190 : 1979	Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (*second revision*)
IS 2925 : 1984	Industrial safety helmets (*second revision*)
IS 3696 (Part 2) : 1991	Safety code for scaffolds and ladders: Part 2 Ladders (*first revision*)

3 PLANNING

3.1 Before beginning the actual work of demolition, a careful study shall be made of the structure which is to be pulled down and also of all its surroundings. This shall, in particular, include study of the manner in which the various parts of the building to be demolished are supported and how far the stage by stage demolition will affect the safety of the adjoining structure. A definite plan of procedure for the demolition work, depending upon the manner in which the loads of the various structural parts are supported, shall be prepared and approved by the engineer-in-charge and this shall be followed as closely as possible, in actual execution of the demolition work. Before the commencement of each stage of demolition, the foreman shall brief the workmen in detail regarding the safety aspects to be kept in view.

3.2 It should be ensured that the demolition operations do not, act any stage, endanger the safety of the adjoining buildings. Moreover, the nuisance effect of the demolishing work on the use of the adjacent buildings should be kept to the minimum.

3.3 No sturcture or part of the structure or any floor or temporary support or scaffold, side wall or any device for equipment shall be loaded in excess of the safe carrying capacity, in its then existing condition.

4 PRECAUTIONS BEFORE STARTING DEMOLITION WORK

4.1 On every demolition job, danger signs shall be conspicuously posted all around the structure and all doors and openings giving access to the structure shall be kept barricaded or manned except during the actual passage of workmen or equipment. However, provision shall be made for at least two independent exits for escape of workmen during any emergency.

4.2 During nights, red lights shall be placed on or about all the barricades.

4.3 Where in any work of demolition it is imperative, because of danger existing, to ensure that no unauthorized person shall enter the site of demolition outside working hours; a watchman should be employed. In addition to watching the site he shall also be responsible for maintaining all notices, lights and barricades.

4.4 All the necessary safety appliances (*see* **15**) shall be issued to the workers and their use explained. It shall be ensured that the workers are using all the safety appliances while at work.

4.5 The removal of a member may weaken the side wall of an adjoining structure and to prevent possible damage, these walls shall be supported until such time as permanent protection is provided. In case any danger is anticipated to the adjoining structure, the same shall be got vacated to avoid any danger to human life.

4.6 The power on all electrical service lines shall be shut off and all such lines cut or disconnected at or outside the property line, before the demolition work is started. Prior to cutting of such lines, the necessary approval shall be obtained from the electrical authorities concerned. The only exception will be any power lines required for demolition work itself.

4.7 All gas, water steam and other service lines shall be shut off and capped or otherwise controlled at or outside the building line, before demolition work is started.

4.8 All the mains and meters of the building shall be removed or protected from damage.

4.9 If a structure to be demolished has been partially wrecked by fire, explosion or other catastrophe, the walls and damaged roofs shall be shored or braced suitably.

4.10 Walkways and passageways shall be provided for the use of the workmen who shall be instructed to use them and all such walkways and passageways shall be kept adequately lighted, free from debris and other materials.

4.11 All nails in any kind of lumber shall be withdrawn, hammered or bent over as soon as such lumber is removed, from the structure being demolished, and placed in piles for future cleaning or burning.

5 PROTECTION OF THE PUBLIC

5.1 Before any demolition work is started, every sidewalk or road adjacent to the work likely to be affected shall be closed or protected.

5.2 Children and members of the public shall be kept out of the building and the adjoining yard.

5.3 If the structure to be demolished is more than two storeyed or 7·5 m high, measured from the sidewalk or street which cannot be closed or safely diverted, and the horizontal distance from the inside of the sidewalk to the structure is 4·5 m or less a substantial sidewalk shed (*see* Fig. 1) shall be constructed over the entire length of the sidewalk adjacent to the structure of sufficient width with a view to accommodating the pedestrian traffic without causing congestion. The sidewalk shed shall be lighted sufficiently to ensure safety at all times.

5.4 A toe board of at least 1 m high above the roof of the shed shall be provided on the outside edge and ends of the sidewalk shed. Such boards may be vertical or inclined outward at not more than 45 degrees.

5.5 Except where the roof of a sidewalk shed solidly abuts the structure, the face of the sidewalk shed towards the building shall be completely closed by providing sheating/planking to prevent falling meterial from penetrating into the shed.

5.6 The roof of sidewalk sheds shall be capable of sustaining a load of 73 N/mm². Only in exceptional cases, say due to lack of other space, the storing of material on a sidewalk shed may be permitted in which case the shed shall be designed for a load of 146 N/mm². Roof of sidewalk shed shall be designed taking into account the impact of the falling debris. By frequent removal of loads it shall be ensured that the maximum load, at any time, on the roof of work shed is not more than 6 000 N/m². The height of sidewalk shed shall be such as to give a minimum clearance of 2·4 m.

5.7 Sidewalk shed opening, for loading purposes, shall be kept closed at all time except during actual loading operations.

5.8 The deck flooring of the sidewalk shed shall consist of plank of not less than 50 mm in thickness closely laid and deck made watertight. All members of the shed shall be adequately braced and connected to resist displacement of members or distortion of framework.

5.9 When the horizontal distance from the inside of the sidewalk to the structure is more than 4·5 m and less than 7·5 m, a sidewalk shed or fence may be built or in place of such a shed or fence a substantial railing shall be constructed on the inside of the sidewalk or roadway along the entire length of the demolition side of the property with movable bars as may be necessary for the proper execution of the work.

5.10 Where workers' entrances to the building being demolished are not completely protected by sidewalk sheds, all such entrances shall be protected by canopies extending from the face of the building to a point not less than 2·5 m from it. In such case such overhead protection shall be at least 0·6 m wider than the building entrance or opening and every canopy shall be as strong as the sidewalk shed, specified in **5.5**.

6 SEQUENCE OF DEMOLITION OPERATIONS

6.1 The demolition work shall be proceeded with in such a way that:

a) it causes the least damage and nuisance to the adjoining building and the members of the public, and

b) it satisfies all saftey requirements to avoid any accidents.

6.2 All existing fixtures required during demolition operations shall be well protected with substantial covering to the entire satisfaction of the rules and regulations of the undertakings or they shall be temporarily relocated.

6.3 Before demolition work is started, glazed sash, glazed doors and windows, etc, shall be removed. All fragile and loose fixtures shall be removed. The lath and all loose plaster shall be stripped off throughout the entire building. This is advantageous because it reduces glass breakage and also eliminates a large amount of dust producing material before more substantial parts of the buildings are removed.

6.4 All well openings which extend down to floor level shall be barricaded to a height of not less than one metre above the floor level. This provision shall not apply to the ground level floor.

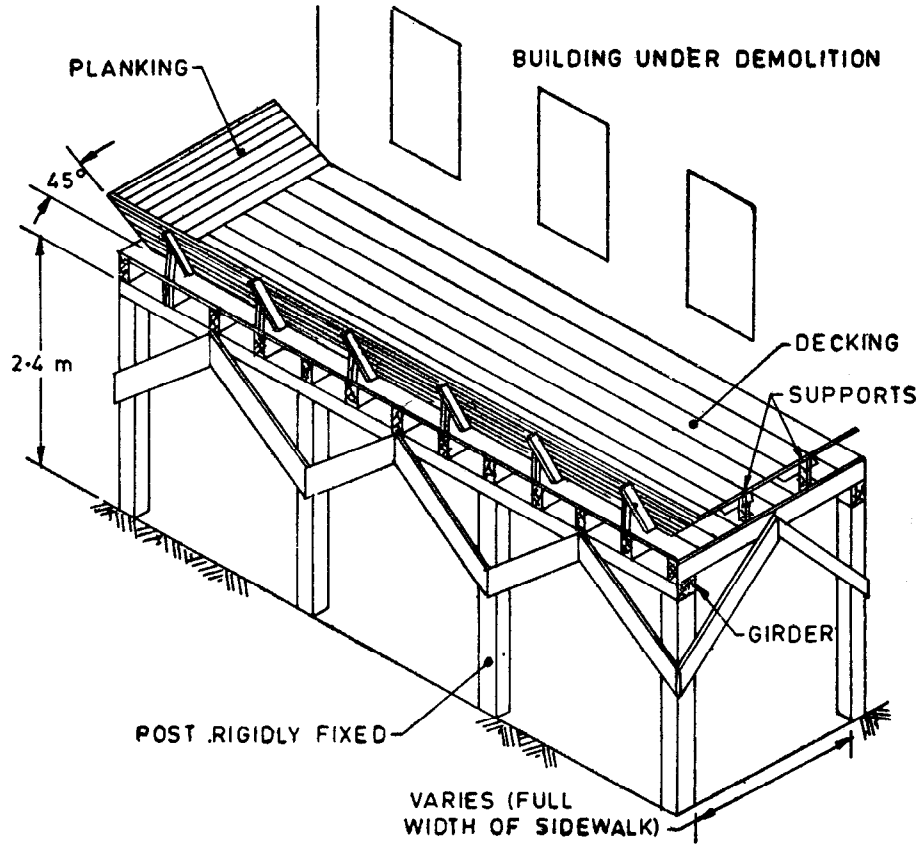


FIG. 1 TYPICAL SKETCH OF A SIDEWALK SHED

6.5 All floor openings and shafts not used for material chutes shall be floored over and be enclosed with guard rails and toe boards.

6.6 The demolition shall always proceed systematically storey by storey in descending order and the work on the upper floors shall be completely over before any of the supporting members or other important portion on the lower floor is disturbed. These requirements shall not prohibit the demolition of structure in sections, if means are taken to prevent injuries, to persons or damage to property.

7 REMOVAL OF MATERIALS

7.1 General

Dismantled materials may be thrown to the ground only after taking adequate precautions. The material shall preferably be dumped inside the building. Normally such materials shall be lowered to the ground or to the top of the sidewalk shed where provided by means of ropes or suitable tackles (*see also* **5.6**).

7.2 Through Chutes

7.2.1 Wooden or metal chutes may be provided for removal of materials. The chutes shall preferably be provided at the centre of the building for efficient disposal of debris.

7.2.2 Chutes, if provided at an angle of more than 45° from the horizontal, shall be entirely enclosed on all the four sides, except for opening at or about the floor level for receiving the materials.

7.2.3 Opening for the chutes (*see* **7.3**) shall not exceed 1.20 m in height measured along the wall of the chute and in all storeys below the top floor such opening shall be kept closed when not in use.

7.2.4 To prevent the descending material attaining a dangerous speed, chute shall not extend in an unbroken line for more than two storeys. A gate or stop shall be provided with suitable means for closing at the bottom of each chute to stop the flow of materials.

7.2.5 Chutes at an angle of less than 45° to the horizontal may be left open on the upper side provided that at the point where such a chute discharges into a chute steeper than 45° to the horizontal, the top of the steeper chute shall be boarded over to prevent the escape of materials.

7.2.6 Any opening into which workmen dump debris at the top of chute shall be guarded by a substantial guard rail extending at least one metre above the level of the floor or other surface on which men stand to dump the materials into the chute.

7.2.7 A toe board or bumper, not less than 50 mm thick and 150 mm high shall be provided at each chute opening, if the material is dumped from the wheel barrows. Any space between the chute and the edge of the opening in the floor through which it passes shall be solidly planked over.

7.3 Through Holes in the Floor

7.3.1 Debris may also be dropped through holes in the floor without the use of chutes. In such a case the total area of the hole cut in any intermediate floor, one which lies between floor that is being demolished and the storage floor shall not exceed 25 percent of such floor area. It shall be ensured that the storage floor is of adequate strength to withstand the impact of the falling material.

7.3.2 Openings in all the floors below the floor from which materials are being removed, shall be protected by standard railings and toe boards or preferably planked over if the holes are not being used for dumping materials.

7.3.3 All intermediate floor openings for passage of materials shall be completely enclosed with barricades or guard rails not less than one metre high and at a distance of not less than one metre from the edge of general opening. No barricades or guard rails shall be removed until the storey immediately above has been demolished down to the floor line and all debris cleared from the floor.

7.3.4 When the cutting of a hole in an intermediate floor between the storage floor and the floor which is being demolished makes the intermediate floor or any portion of it unsafe, then such intermediate floor shall be properly shored. It shall also be ensured that the supporting walls are not kept without adequate lateral restraints.

7.4 Removal of Debris/*Malba*

7.4.1 As demolition work proceeds, the released serviceable materials of different types shall be separated from the unserviceable lot (hereafter called '*Malba*') at suitable time intervals and properly stocked clear of the spots where demolition work is being done.

7.4.2 The *Malba* obtained during demolition shall be collected in well-formed heaps at properly selected places, keeping in view safe conditions for workmen in the area. The height of each *Malba* heap shall be limited to ensure its not toppling over or otherwise endangering the safety of workmen or passers by.

7.4.3 The *Malba* shall be removed from the demolition site to a location as required by the local civil authority. Depending on the space available at the demolition site, this operation of conveying *Malba* to its final disposal location may have to be carried out a number of times during the demolition work. In any case, the demolition work shall not be considered as completed and the area declared fit for further occupation till all the *Malba* has been carried to its final disposal location and the demolition area tidied up.

7.4.4 Materials which are likely to cause dust nuisance or undue environmental pollution in any other way, shall be removed from the site at the earliest and till then they shall be suitably covered. Such materials shall be covered during transportation also.

7.4.5 Unauthorized use of the debris or *Malba* in any work shall not be permitted. The released materials classed as 'serviceable' shall be inspected by a competent person before being used.

8 STAIRS, PASSAGEWAYS AND LADDERS

8.1 Stairs and stair railings, passageways and ladders shall be left in place as long as possible.

8.2 For the use of ladders, provisions laid down in IS 3696 (Part 2) : 1991 shall be followed.

8.3 All stairs, passageways and ladders to be used by workmen during the process of demolition shall be maintained in a safe condition.

8.4 Ladders or their side rail extend not less than 1·0 m above the floor or platform to which such ladder gives access.

8.5 All ladders shall be secured against, slipping out at the bottom and against movement in any direction at the top.

9 DEMOLITION OF WALLS

9.1 While walls or sections of masonry are being demolished, it shall be ensured that they are not allowed to fall as single mass upon the floors of the building that are being demolished so as to exceed the safe carrying capacity of the floors. Overloading of floors shall be prevented by removing the accumulating debris through chutes or by other means immediately. The floor shall be inspected by the engineer-in-charge before undertaking demolition work and if the same is found to be incapable to carry the load of the debris, necessary additional precautions shall be taken so as to prevent any possible unexpected collapse of the floor.

9.2 Walls shall be removed part by part. Stages shall be provided for the men to work on, if the walls are very thin and dangerous to work by standing over them.

9.3 No section of wall whose height is more than 15 times of thickness, shall be permitted to stand without lateral bracing unless such wall is in good condition and was originally designed to stand without such lateral bracing or support.

9.4 Structural or load supporting members on any floor shall not be cut or removed until all the storeys above that floor have been demolished and removed.

9.5 Before demolishing any interior or exterior wall within 3 m of the opening in the floor immediately below, such opening shall be substantially planked over, unless access is denied to workmen to that portion of the area of the floor immediately below the opening, in the floor of the storey being demolished, where any debris pieces passing through this opening may fall.

9.6 In framed structures, the steel frame may be left in place during demolition of masonry work. Where this is done, all steel beams, girders, etc, shall be cleared of all loose materials as the demolition of masonry work progress downward provided it is still strong enough to stand as an independent structure.

9.7 Walkways shall be provided to enable workmen to teach or leave their work on any scaffold or wall. Such walkways shall be not less than 3 planks, nor less than 0·8 m in width.

9.8 At the completion of each day's work, all walls shall be left stable to avoid any danger of getting overturned.

9.9 Foundation walls which serve as retaining walls to support earth or adjoining strcuture, shall not be demolished until such an adjoning structure has been underpinned or braced and the earth removed by sheet piling or sheathing.

10 DEMOLITION OF FLOORS

10.1 In cutting holes in a floor which spans in one direction, a slit of width not exceeding 300 mm shall be cut at the first stage for the entire length of the slab along which it spans (*see* Fig. 2). The opening shall thereafter be increased to the desired width by suitable instalments.

10.2 Planks of sufficient strength not less than 50 mm thick and 250 mm wide shall be provided at spacing not greater than 0·4 mm for the workmen to work. The length of planks shall not be less than 2 mm. These planks shall be so placed as to give workmen firm support to guard against any unexpected floor collapse.

10.3 Stringers of ample strength shall be installed to support the planks where necessary and the ends of such stringer shall be supported by floor beams, girders and not by floor slab alone.

10.4 When floors are being removed, no workmen shall be allowed to work in the area, directly underneath and such area shall be barricaded to prevent access to it.

10.5 The demolition of floor shall be started only after the floor in question and the surrounding floor area for a distance of 6·0 m have been entirely cleared of persons, and the debris and other unnecessary material removed.

10.6 Planks used for temporary protection shall be sound and at least 50 mm thick. They shall be laid close together with the ends having at least 100 mm bearing over solid support to prevent tipping under load. If corrugated GI Sheets are used for temporary protection, it shall be secured to the solid support with suitable framework.

11 DEMOLITION OF STEEL STRUCTURES

11.1 When a derrick is used, care shall be taken to see that the floor on which it is supported is amply strong for the loading so imposed. If necessary heavy planking shall be used to distribute the load to floor beam and girders.

11.2 Overloading of equipment shall not be allowed.

11.3 Tag lines shall be used on all materials being lowered or hoisted up and a standard

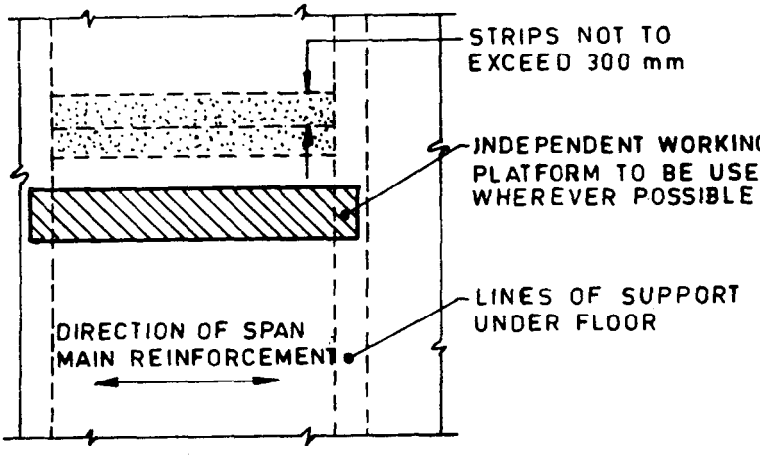


FIG. 2 DEMOLITION OF REINFORCED CONCRETE FLOORS

signal system shall be used and the workmen instructed on the signals.

11.4 No person shall be permitted to ride the load line.

11.5 No beams shall be cut until precautions have been taken to prevent it from swinging freely and possibly striking any worker or equipment to any part of the structure being demolished.

11.6 All structural steel members shall be lowered from the building and shall not be allowed to drop.

12 CATCH PLATFORMS

12.1 In demolition of exterior wall of multi-storeyed structure, it is advisable to provide catch platform of heavy planking to prevent injuries to the worker working below and to the public, when the external walls are more than 20 m in height.

12.2 Such catch platform shall be constructed and maintained not more than 3 storeys below the storey from which exterior wall is being demolished. When demolition has progressed to within 3 storeys of ground level, catch platform will not be considered necessary.

12.3 Catch platforms shall not be less than 1·5 m in width, measured in a horizontal direction from the face of the structure and shall consist of outriggers and planks. Planks shall be laid tight together, without openings between them and the walls. Catch platform shall be provided with a continuous solid parapet along its outer edge of at least 1 m height. The parapet shall be constructed of the same specification as the platform.

12.4 Catch platform can be constructed of material other than wood also, provided such material is of equal strength.

12.5 Catch platform shall be capable of sustaining a live load of not less than 6 100 N/m^2.

12.6 The outriggers shall be of ample strength and shall not be spaced more than 3 m apart.

12.7 Materials shall not be dumped on catch platform nor such catch platform shall be used for the storage of materials.

13 MECHANICAL DEMOLITION

When demolition is to be performed by mechanical devices, such as weight ball and power shovels, the following additional precautions my be observed:

a) The area shall be barricaded for a minimum distance of 1½ times the height of the wall;

b) While the mechanical device is in operation, no workmen shall be allowed to enter the building being demolished;

c) The device shall be so located as to avoid falling debris; and

d) The mechanical device when being used shall not cause any damage to adjacent structure, power line, etc.

14 RECOMMENDATIONS FOR DEMOLITION OF CERTAIN SPECIAL TYPES AND ELEMENTS OF STRUCTURES

14.1 Roof Trusses

If a building has a pitched roof, the roof structure should be removed to wall plate level by hand methods. Sufficient purlins and bracing should be retained to ensure stability of the remaining roof trusses while each individual truss is removed progressively.

14.1.1 Temporary bracing should be added, where necessary, to maintain stability. The end frame opposite to the end where dismantling is commenced, or a convenient intermediate frame should be independently and securely guyed in both directions before work starts.

14.1.2 On no account should the bottom tie of roof trusses be cut until the principal rafters are prevented from making outward movement.

14.2 Heavy Floor Beams

Heavy baulks of timber and steel beams should be supported before cutting at the extremities and should then be lowered to a safe working place.

14.3 Jack Arches

Where tie rods are present between main supporting beams, these should not be cut until after the arch or series of arches in the floor have been removed. Particular care should be exercised and full examination of this type of structure undertaken before demolition is commenced (*see* Fig. 3). The floor should be demolished in strips parallel to the span of the arch rings (at right angles to the main floor beams).

14.4 Brick Arches

14.4.1 Expert advice should be obtained and, at all stages of the demolition, the closest supervision should be given by persons fully experienced and conversant in the type of work to ensure that the structure is stable at all times.

14.4.2 As much dead load as possible may be removed provided it does not interfere with the stability of the main arch rings, but it should be noted that the load-carrying capacity of many old arches relies on the filling between the spandrels. On no account should the restraining influence of the abutments be removed before the dead load of the spandrel fill and the arch rings are removed.

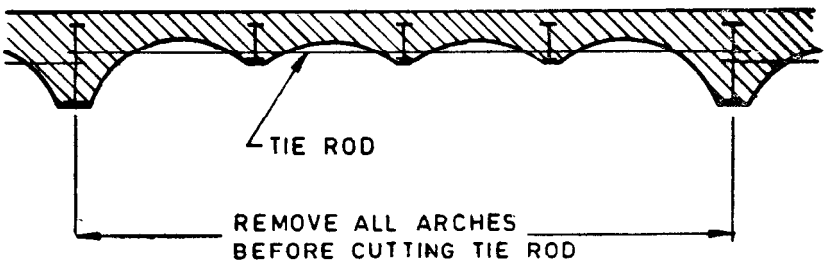


FIG. 3 DEMOLITION OF JACK ARCHES

14.4.2.1 The normal sequence of demolition is as shown in Fig. 4A, namely:

a) Remove spandrel in filling down to the springing line,

b) Remove the arch rings, and

c) Remove the abutment.

14.4.2.2 Special temporary support shall be provided in the case of skew bridges.

14.4.3 A single span arch can be demolished by hand by cutting narrow segments progressively from each springing parallel to the span of the arch, until the width of the arch has been reduced to a minimum which can then be collapsed (*see* Fig. 4B).

14.4.3.1 Where it is impossible to allow debris to fall to the ground below, centering designed to carry the load should be erected and the arch demolished progressively. The design of the centering should make appropriate allowance for impact.

14.4.4 Where deliberate collapse is feasible the crown may be broken by the demolition ball or hod working progressively from edges to the centre (*see* Fig. 4C).

14.4.5 Collapse of the structure can be effected in one action by the use of explosives. Charges should be inserted into boreholes drilled in both arch and abutments. This method is the most effective for demolition of tall viaducts.

14.4.6 In multi-span arches before individual spans are removed, lateral restraint should be provided at the springing level. Demolition may then proceed as for a single span, care being taken to demolish the spandrels down to the springing line as the work proceeds (*see* Fig. 4D). Where explosives are used it is preferable to ensure the collapse of the whole structure in one operation to obviate the chance of leaving unstable portions standing.

14.5 Cantilevers (Not Part of a Framed Structure)

A cantilever type of construction depends for its stability on the superimposed structure. Canopies, cornices, staircases and balconies should be demolished or supported before the tailing down load is removed.

14.6 *In-Situ* Reinforced Concrete

14.6.1 Before commencing demolition, the nature and condition of the concrete, the condition and position of reinforcement, and the possibility of lack of continuity of reinforcement should be ascertained.

14.6.1.1 Attention should be paid to the principles of the structural design to determine which parts of the structure depend on each other to maintain overall stability.

14.6.2 Demolition should be commenced by removing partitions and external non-load bearing cladding. It should be noted that in some buildings the frame may rely on the panel walls for stability.

14.6.2.1 Where hard demolition methods are to be used, the following procedures should be used:

a) *Reinforced concrete beams*

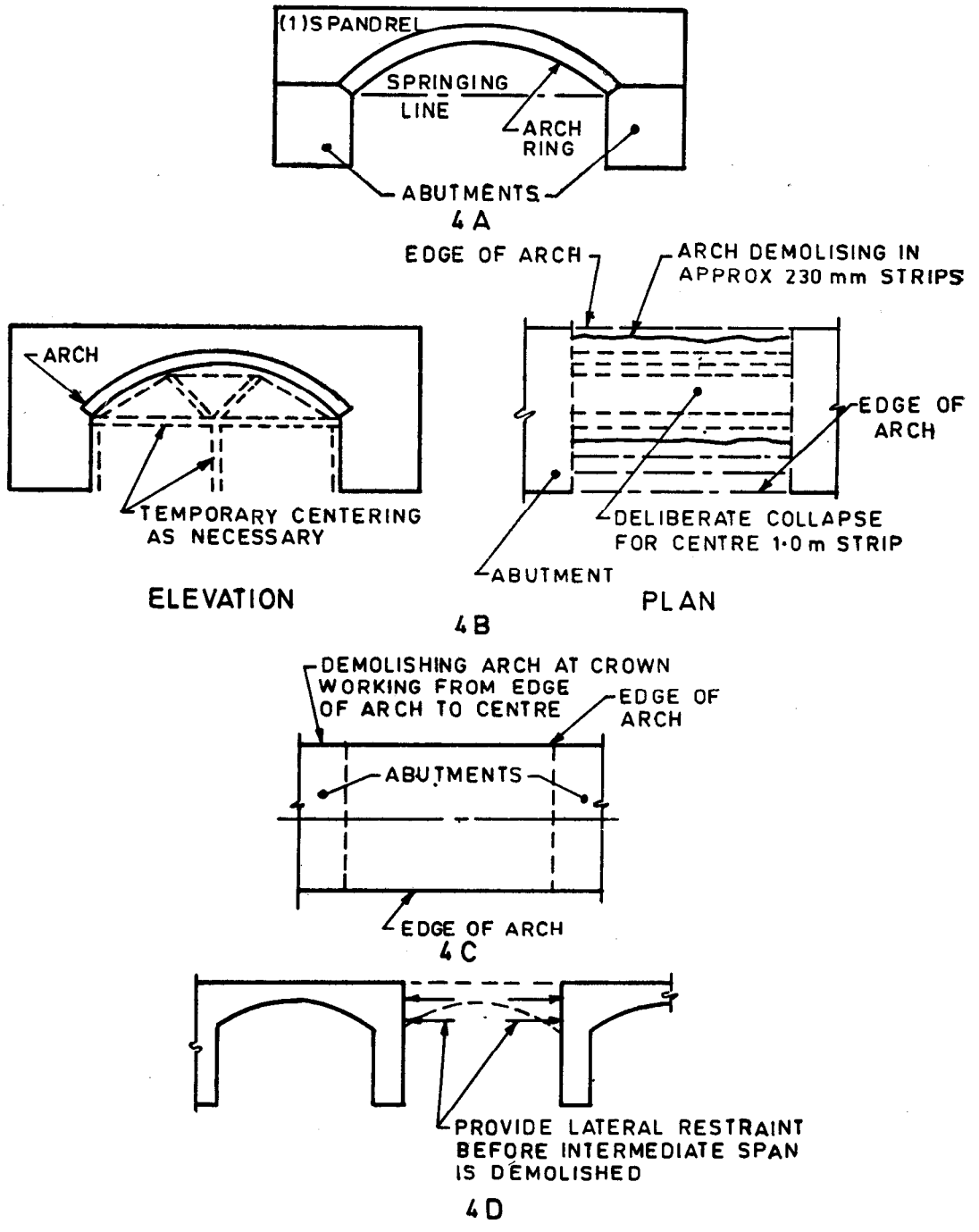
For beams, a supporting rope should be attached to the beam. Then the concrete should be removed from both ends by pneumatic drill and the reinforcement exposed. The reinforcement should then be cut in such a way as to allow the beam to be lowered under control to the floor (*see* Fig. 5A).

b) *Reinforced concrete columns*

For columns, the reinforcement should be exposed at the base after restraining wire guy ropes have been placed round the member at the top. The reinforcement should then be cut in such a way as to allow the column to be pulled down to the floor under control (*see* Fig. 5B for sequence of operations).

c) *Reinforced concrete walls*

Reinforced concrete walls should be cut into strips and demolished as for columns (*see* Fig. 5C).



NOTE — Order of Demolition.

FIG. 4 DEMOLITION OF MASONRY AND BRICKWORK ARCHES

d) *Suspended floors and roofs*

Before demolishing suspended floors and roofs, the type of construction should be ascertained. In solid slabs, the direction of the main reinforcement should be determined; the slab should then be cut into strips parallel to the main reinforcement and demolished strip by strip (*see* **10** and Fig. **2**). Where ribbed construction has been used, the principle of design and method of construction should be determined before demolition is commenced. Care should be taken not to cut the ribs inadvertently.

14.7 Precast Reinforced Concrete

14.7.1 Precast reinforced concrete units used in a structure are normally held in position by the strength of the joints made *in-situ* or on supporting walls, etc. As such, before starting on demolition, the joint structures and/or the supporting mechanisms shall be studied and understood.

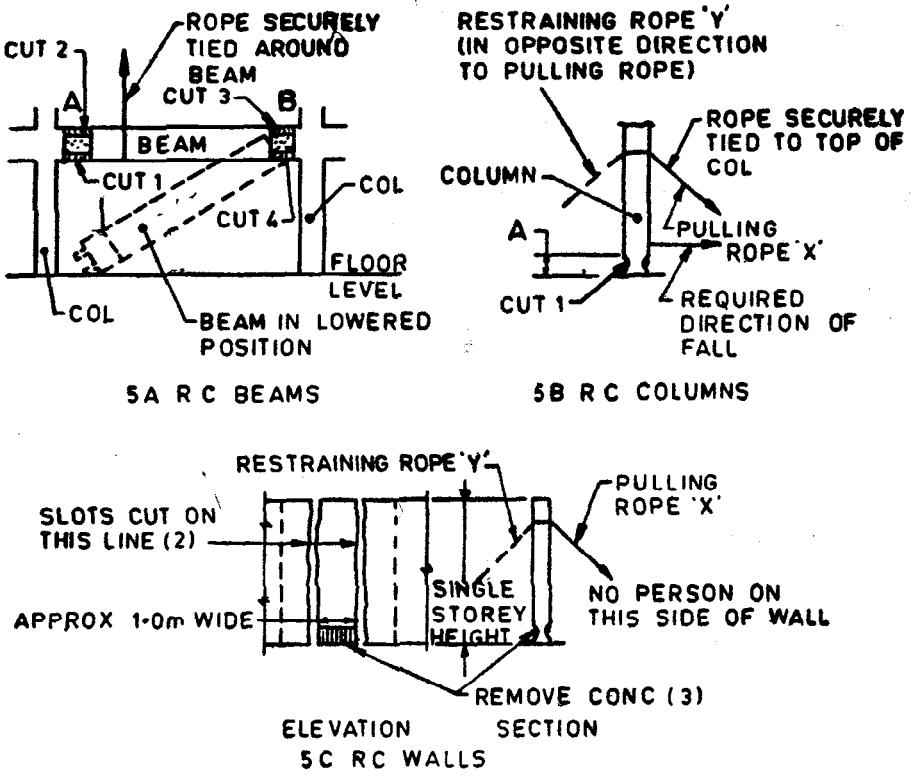


FIG. 5 HAND DEMOLITION OF *In-Situ* CONCRETE STRUCTURE

14.7.2 In devising and following the demolition sequences due precaution shall be taken to avoid toppling over of prefabricated units or any other part of the structure and wherever necessary temporary supports shall be provided.

14.8 Prestressed Reinforced Concrete

Before commencing of the demolition work involving such structures advice of an engineer expert in such demolition shall be obtained and followed.

14.9 Chimney and Spires

Before commencing of the demolition work, involving such structures, advice of an engineer expert in such demolition shall be obtained and followed.

15 MISCELLANEOUS

15.1 No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.

15.2 No demolition work shall be carried out during storm and heavy rain.

15.3 A warning device shall be installed in the area to be used to warm the workers in case of any danger.

15.4 Safety helmets conforming to IS 2925 : 1984 shall be used by the workmen where there is any likelihood of material falling from top.

15.5 Construction sheds and tool boxes should be located away from areas of falling debris to avoid injuries to users.

15.6 Goggles preferably made of celluloid lens shall be worn at the time of demolition of walls, floors, tearing of plaster, etc, especially when instruments like jack hammers are employed in demolition work, to protect the eyes from injuries from flying pieces, dirt, dust, etc, that may be blown up by the wind.

15.7 It is desirable that leather or rubber gloves should be worn by the workers while demolishing RCC work or removing steel work, etc, where the hands of the workers are likely to be injured.

15.8 Screens shall be placed, where necessary, to prevent flying pieces from injuring the fellow workmen.

15.9 Water may be used to reduce dust while tearing down plaster from brickwork. If this is impracticable, workmen shall cover the face and nose with piece of muslin or alternatively respirators.

15.10 No unnecessary work shall go on below when demolition is in progress above. When some work is to be done at the lower level, adequate protection shall be provided for all the workmen so engaged.

15.11 Safety belts shall be used by labourers while working at higher level to prevent falling from the structure.

15.12 First-aid equipment shall be got available at all demolition works of any magnitude. Also, by prior arrangement, a qualified doctor shall be available at call.

15.13 When there is a possibility of fire breaking out, appropriate portable first-aid fire appliances (*see* IS 2190 : 1979) shall be kept at hand.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference :

Doc : No. CED 45 (4831)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :	Telephones
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW Delhi-110002	331 01 31 331 13 75
Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola CALCUTTA 700054	37 86 62
Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036	53 38 43
Southern : C.I.T. Campus, IV Cross Road, MADRAS 600113	412916
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) BOMBAY 400093	6 32 92 95

Branches : AHMADABAD, BANGALORE, BHOPAL, BHUBANESHWAR, COIMBATORE, FARIDABAD, GHAZIABAD, GUWAHATI, HYDERABAD, JAIPUR, KANPUR, PATNA, THIRUVANANTHAPURAM.

Printed at Swatantra Bharat Press, Delhi, India