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भारत सरकार – Government of India

रेल मंत्रालय – Ministry of Railways

भवनों का विखण्डन

Dismantling of Buildings



केमटेक/2016/सि/डी.बी./1.0

CAMTECH/2016/C/D.B./1.0

फरवरी - 2016 / February - 2016

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Centre for Advanced Maintenance Technology

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भवनों का विखण्डन

Dismantling of Buildings

प्राक्कथन

भारतीय रेल, एक प्रमुख संस्थान होने के नाते इसके पास भवनों एवं संरचनाओं की एक विशाल श्रंखला मौजूद है, जिनमें आवासीय एवं कार्यालय भवनों का समावेश है।

भारतीय रेल की कई संरचनायें अपनी निर्धारित आयु पहले ही पूर्ण कर चुकी हैं और संरक्षा एवं संचालन हेतु उन्हें पुनः निर्माण की जरूरत है और पुराने भवनों को विखण्डित कर नये निर्माण की जरूरत है।

इस पुस्तक के द्वारा कैमटेक ने भवनों के विखण्डन के दौरान अपनायी जाने वाली संरक्षा सावधानियों की जानकारी देने का प्रयास किया है।

मुझे उम्मीद है कि यह पुस्तक अभियांत्रिक विभाग के लोगों के लिये जानकारी का महत्वपूर्ण स्त्रोत होकर उपयोगी सिद्ध होगी।

कैमटेक, ग्वालियर — ए. आर. तुपे

दिनांक :12 फरवरी 2016 — कार्यकारी निदेशक

Forward

Indian Railways is a premier organisation having vast network of buildings and structures including office building and residential buildings.

Many of the structures of Indian Railways have already passed their design life and need to be reconstructed for safety and operational requirement. Such old buildings need to be dismantled for replacement by new one.

Through this hand book, CAMTECH has made an attempt to provide the various safety precautions to be adopted for dismantling of buildings.

I hope this hand book will have to be a valuable source of information and will be helpful to civil engineering personnel in railways.

CAMTECH/ Gwalior **(A. R. Tupe)**
Date :12 February 2016 **Executive Director**

भूमिका

भारतीय रेल के पास इमारतों एवं संरचनाओं की एक विशाल ढाँचागत व्यवस्था है। अन्य विभागों की इमारतों की तरह भारतीय रेल की प्रत्येक इमारत की एक निश्चित मानक आयु होती है तथा उसके बाद, उसमें रहने वालों की संरक्षा के लिए इमारत को विखंडित कर पुनः निर्मित किया जा सकता है।

भारतीय रेल में कई इमारतें अपनी निर्धारित आयु पूर्ण कर चुकी हैं तथा उनके पुनः निर्माण की जरूरत है। कुछ इमारतें नई रेल्वे लाइन या रोड इत्यादि की परियोजनाओं में रुकावट डालती हैं, और कई बार इमारतों को विखंडित करना जरूरी हो जाता यदि वे प्राक्रतिक आपदाओं जैसे बाढ़, भूकंप, अग्नि के कारण क्षतिग्रस्त हो जाती हैं या उनका निर्माण रेल्वे सीमा में अनाधिकृत और गलत तरीके से हो जाता है।

यह अनुभव किया गया है कि "भवनों का विखंडन" विषय पर एक हस्त पुस्तिका इस उद्देश्य के साथ तैयार की जाये कि अभियांत्रिकी विभाग में कार्यरत व्यक्तियों को विखंडन कार्य हेतु योजना तथा अपनायी जाने वाली सावधानियाँ, जो कि कामगारों एवं निवासियों तथा आसपास के भवनों की संरक्षा के सुधार के लिए हो, की जानकारी दी जा सके।

यह पुस्तिका वैधानिक नहीं है तथा इसमें दी गई जानकारी का उद्देश्य केवल मार्गदर्शन है । किसी न किसी रूप में अधिकांश आंकड़े एवं जानकारी साहित्य सर्वेक्षण तथा इंटरनेट खोज पर आधारित है। अधिक जानकारी के लिए इस पुस्तिका में निहित किसी भी जानकारी को अंतिम रूप से लागू करने से पहले विषय पर उपलब्ध प्रासंगिक साहित्य का अध्ययन संदर्भ रूप में किया जाना चाहिए।

इस पुस्तिका के सुधार हेतु पाठकों के किसी भी सुझाव का हम स्वागत करते हैं।

कैमटेक, ग्वालियर **डी. के. गुप्ता**
तारीख़ : 11 फ़रवरी 2016 **उपनिदेशक (सिविल)**

Preface

Indian Railways has vast infrastructural setup of building and structures. As similar to other departments, every building in railway has a certain design life and after that the building can be dismantled for reconstruction for the safety of residents.

In the railway, many buildings have passed their life and need to be reconstructed. Some buildings are having obstruction for such new projects like railway line or roads etc, and sometimes, it is necessary to dismantle the buildings if they get damaged by climates like flood, rain, earthquake, fire and due to illegal or unauthorised construction in the railway premises.

It is being felt that a hand book on "Dismantling of Building" is to be prepared with the objective to disseminate the knowledge to the civil engineering personal about the planning and precautions, which are to be taken in the dismantling work for improving the safety of workers & residents and adjacent buildings.

This handbook is not statutory and contents are only for the purpose of guidance to the civil engineering personnel involved in construction activities. Most of the data & information in some form or the other are based on literature survey and internet search. For more in-depth information, the relevant codes and literature on the subject may be referred before final implementation of any information contained in this handbook.

We welcome any suggestions from our readers for further improvement.

CAMTECH/Gwalior **(D.K.Gupta)**
Date :11 February 2016 **Dy. Director (Civil)**

विषय सूची / CONTENT

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संशोधन पर्ची

ISSUE OF CORRECTION SLIPS

The correction slips to be issued in future for this handbook will be numbered as follows:

केमटेक/2016/सि/डीबी/1.0 # XX दिनांक _____

CAMTECH/2016/DB/1.0/CS # XX date _____

Where "XX" is the serial number of the concerned correction slip (starting from 01 onwards).

CORRECTION SLIPS ISSUED

Sr. No.	Date of issue	Page no. and Item No. modified	Remarks

1. परिचय / Introduction

Dismantling of any building is, inherently, more hazardous than the construction of the building. Dismantling of building is required because of the facts that –

i) Every building has a certain design life depending upon their construction. After the design life the building is dismantled to reconstruct for the safety.
ii) Some time building get damaged by natural calamities like flood, fire, earth quake and other reasons, then the building becomes unsafe for users.
iii) Some time building being an obstruction for other activities like making railway line, road or build much bigger complex than the one.
iv) If building is constructed illegally or unauthorized way, then such need to be dismantled.

There are multiple types of dismantling procedures used to take down structures. The choice of dismantling method depends on the project conditions, site constraints, and sensitivity of the neighbourhood and availability of equipment. Several methods of dismantling can be used in combination or at different parts of the dismantling site. In general, the choice of technique should enable the re-use and/or the recycling of materials arising from the dismantling. Irrespective of which dismantling method is adopted, its choice should be based on minimizing the risk to personnel.

Simple manual dismantling is indicated for smaller buildings such as single story homes. Manual dismantling usually involves pulling the structure down. Closely related is mechanical dismantling. Mechanical dismantling involves both the pulling down and the knocking down of the structure by machines. Mechanical dismantling uses such machinery as bulldozers, cranes, and excavators. Quite often smaller buildings use a combination of manual and mechanical methods. Larger structures involve wrecking balls.

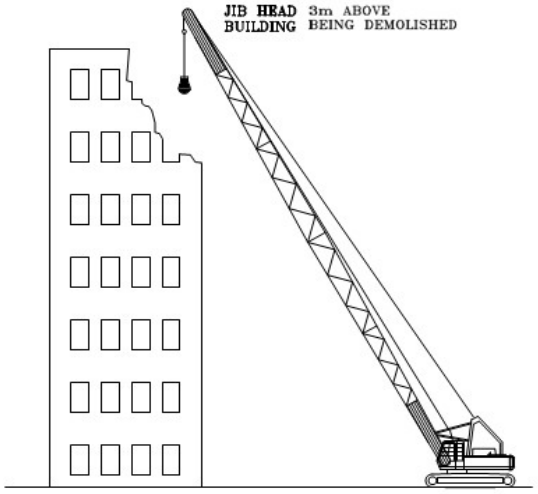


Figure: Wrecking Ball

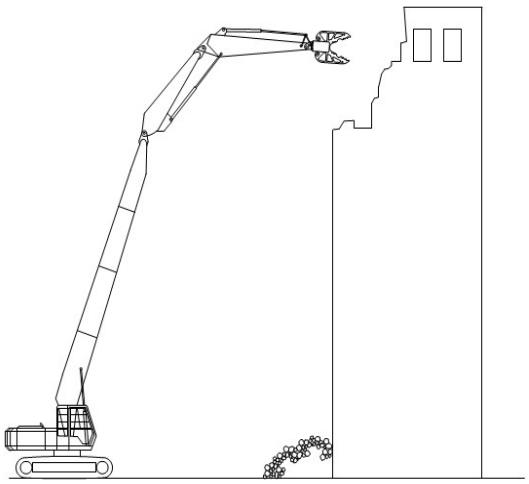


Figure: Hydraulic Crusher

Most of these methods are top down methods where the dismantling starts from the top floor and proceeds towards the ground. For structural projections, such as balconies, canopies and verandas extending beyond the building lines, dismantling by hand held tools or the cut and lift process may be a safe solution.

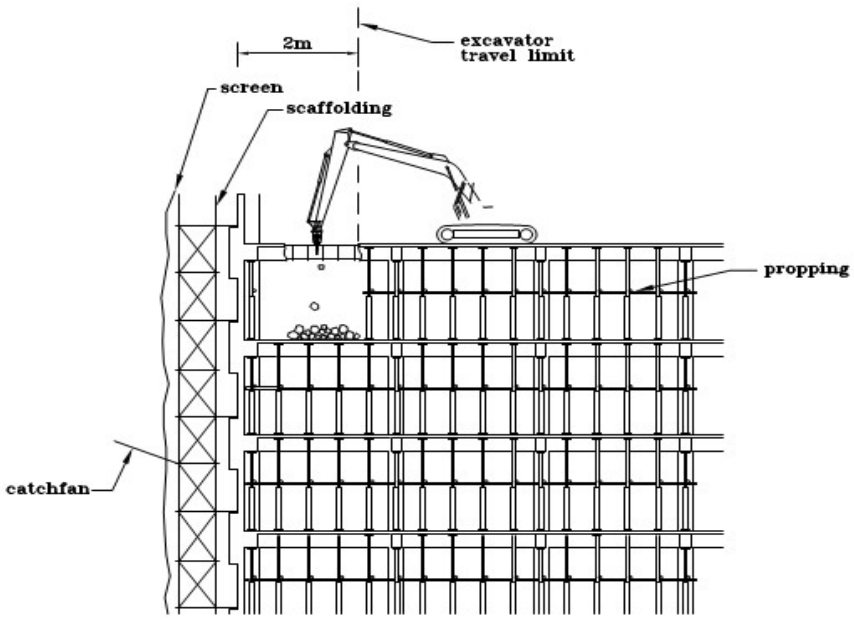


Figure: Top down method sequence

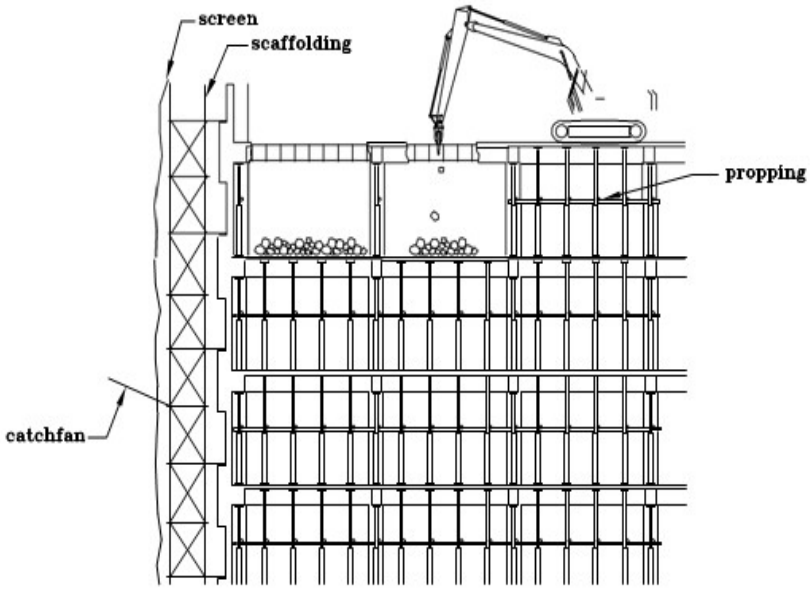


Figure: Top down method sequence

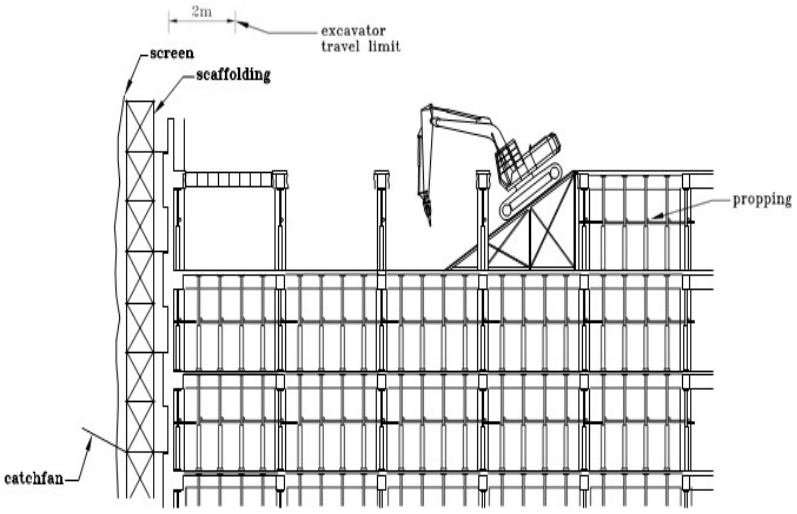


Figure: Top down method sequence

The most dramatic type of dismantling is implosion. This involves a controlled series of explosions that causes a collapse of the structure. The explosive charges are placed and fired in a controlled manner that causes the building to come down into its own "footprint", minimizing damage to surrounding structures. Implosion is only used as a last resort because of the high safety risk involved. This type of dismantling takes a long time to set up and a long time to clean up, but the actual implosion process takes mere seconds to unfold.

A new type of dismantling that is growing in popularity is called "deconstruction". This is the most environmentally sound method of dismantling and it is sometimes called "Green dismantling" for this reason. It involves a slow and careful process that is almost the reverse of the construction method. The building is slowly taken apart and as much material as possible is salvaged for reuse elsewhere. This lightens the load on the landfills that usually receive the debris of a building destroyed by conventional dismantling procedures.

Adequate planning for execution of dismantling work, precautions before and during the dismantling work, in the various stages, so as to minimize the risk of accidents and injuries to the personals engaged in the work should be ensured as mentioned below.

Dismantling requires great care and should be processed in such a way that it causes least damage and nuisance to the adjoining buildings and the members of public. It should also satisfy all safety requirements to avoid accidents.

2. योजना / Planning

Before beginning the actual work of dismantling, 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 dismantling will affect the safety of the adjoining structure. A definite plan

of procedure for the dismantling 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 dismantling work. Before the commencement of each stage of dismantling, the site supervisor in charge shall brief the work-men in detail regarding the safety aspects to be kept in view.

It has to be ensured that the dismantling works do not endanger, at any stage, the safety of the adjacent building and minimum nuisance affect should be kept.

Prior to dismantling, detailed building surveys and structural survey of the building is necessary. Photographs or videos are taken for future reference. Prior to the Building Survey, the existing record plan, including layout plan showing adjoining properties, pedestrian walkway, roads and street, etc. shall be retrieved. Based on the findings of these surveys, a dismantling plan shall then be prepared. The dismantling plan must have structural calculations for assessing the stability of the building.

2.1 भवनों का सर्वेक्षण / Building Survey: The Building Survey shall cover the following:

- The construction materials.
- The existing use and, if possible, the past uses of the building prior to dismantling.
- The presence of hazardous materials. If present they should be removed and cleaned/disposed off accordingly to the statutory norms.
- Possible dangerous areas of the building if any.
- Details of adjoining properties and other utilities services present at site.
- Hoarding and covered walkways requirements.
- Adjoining pedestrian and vehicular traffic conditions.

2.2 संरचनात्मक सर्वेक्षण / Structural Survey: Structural survey consists of the study of followings;

i) Existing layout
ii) Structural plans
iii) Structural details
iv) If existing record plans are available, these plans shall be used as reference and preferably be brought along with the Structural Survey.

The Structural Survey shall cover the following:

- The structural materials used and the structural system of the design.
- The method of construction.
- Degree of deterioration on any structural elements.
- The structural conditions of adjoining structures.
- The nature of wall, whether it is masonry wall, reinforced concrete wall, loads bearing wall or partition wall.
- Cantilevered structures such as canopies, balconies, or other forms of architectural features; and

- Any fixtures to the building such as signboard, sun-shading devices and other temporary supports.

2.3 विखंडन योजना एवं स्थायित्व रिपोर्ट /Dismantling Plan and Stability Report

A. Dismantling Plan: A Dismantling Plan shall include the following:

- The location of the building to be dismantled.
- Detailed topography of the site and its surrounding.
- The distances from the building to be demolished to its adjacent buildings, streets and structures.
- The structural support system.
- Procedure, method and sequence of dismantling.
- Details of all unconventional structural elements, such as pre-stressed concrete structures, precast concrete members, framed steel structures, trusses or girders, arches, cantilevered structures etc should be recorded in plan.
- All possible precautionary measures for the protection of the public including hoardings, covered walkways, catch platforms, catch fans, scaffolding, protective screens and safety nets etc.
- Proposed shoring and temporary supports to be provided to the building and the adjacent building.
- Route of movement of powered mechanical plant and equipment if used.
- Proposed method of handling and disposal of debris.

B. Stability Report

The Dismantling Plan must be accompanied by a Stability Report with supporting calculations. The Stability Report shall include the following parts:

- A report on the stability of the building to be demolished during all stages of dismantling.
- In the case when powered mechanical plants or equipment are used, a report on the stability of the building with supporting calculations to demonstrate that the use of the plants and equipment will not render inadequate the margin of safety of, or cause damage to any building, structure, street, land and services.
- In the case when powered mechanical plants or equipment are used, structural calculations for all temporary supports and bracings.
- A report on the stability of neighboring buildings, adjoining properties, party walls, streets, land and services which may be affected by the dismantling work.
- In the case when temporary or permanent supports are required to these neighboring buildings, adjoining properties, and party walls, structural calculations for these temporary and permanent supports and
- A report with calculations demonstrating that the dismantling work will not render inadequate the margin of safety of, or cause damage to any building, structure, street, land and services.

2.4 उपयोगिता/Utilities:

- The common utilities encountered in building dismantling generally include the following: Electricity, Water, Gas, Telecommunication, Drainage, Sewerage, Overhead and Underground Cables etc.
- Keep liaising with all available utility departments before the dismantling, so as to be terminated accordingly.
- It is to be ensured that no existing utilities in the vicinity of the dismantling site are affected by the dismantling operation.

3. विखंडन से पहले की सावधानियाँ एवं सुरक्षात्मक उपाय /Precautions and protective measures before starting dismantling work:

The following precautions and protective measures shall be taken before commencement of demolition work:

a) On every demolition job, danger signals shall be conspicuously posted all round the structure and all doors openings giving access to structures 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.

b) 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 all debris and other materials.



c) Where in any work of demolition it is imperative, because of existing danger, to ensure that no unauthorized person shall enter the site of demolition outside working hours, a watchman shall be employed. In addition to watching the site he shall also be responsible for maintaining all signs, notices, lights, barricades, etc. During night, red lights shall be placed on or about the barricades.

d) The power on all electrical service lines shall be shutoff and all such lines cut or disconnected at or outside the property line. The only exception would be any power lines required for the demolition work itself. Prior to cutting of such lines, the necessary approval of the concerned Authority shall be obtained.

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

f) All gas, water, steam and other service lines shall be shut off and capped or otherwise controlled at or outside the property line.

g) If a structure to be demolished has been partially wrecked by fire, explosion or other catastrophe, the walls and damaged roofs shall be shored and braced suitably.
h) Construction sheds and tool boxes should be so located as to protect workers from injuries of falling objects, wall, etc.
i) A warning device should be installed in the area to be used to warn the workers, in case of danger.
j) Screens shall be placed, where necessary, to prevent flying pieces from injuring the fellow workmen.
k) No demolition work shall be carried out during storm or heavy rain.
l) No demolition work shall be carried out at night especially when the building or structure to be demolished is in habited area except in special circumstances and when specifically approved by the Engineer.
m) All necessary safety appliances shall be issued to the workmen and their use explained. It shall be ensured that the workers are using all the safety appliances while at work. The safety appliances should be as follows:

- Safety helmets as per IS 2925: 1984
- Goggles made of celluloid lens to be worn at the time of demolition of floors, walls, tearing of plaster, etc, especially when equipment like jack hammers are used for demolition work, to protect the eyes from flying pieces, dust, dirt, etc that may be blown up by wind.
- Leather or rubber gloves worn during demolition of RCC work or removing steel work, where the hands of workers are likely to be injured.
- Safety belts while working at higher level to prevent falling from the structure.

n) First-aid equipment shall be available at all demolition works of any magnitude. Also, by prior arrangement, a qualified doctor should be available at call.
o) When there is a possibility of fire breaking out, appropriate portable first-aid fire appliances (see IS 2190:1992) shall be kept at hand.
p) 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.
q) Ladders, when used, shall conform to IS 3696 (Part 2): 1991. Ladders or their side rails shall extend not less than 1.0m above the floor or platform to which the ladder gives access. All ladders shall be secured against slipping out at the bottom and against movement in any direction at the top.
r) All exterior wall openings which extend down to the floor level shall be barricaded to a height not less than 1.0 m above the floor level. All floor openings and shafts not meant as material chutes shall be floored over and endorsed with ground rails and toe boards.
s) All existing fixtures/ services required during demolition operations shall be well protected with substantial covering to the satisfaction of the Engineer.

t) When demolition is to be done by mechanical means such as weight ball and power shovels, the following additional precautions are necessary:

- The area shall be barricaded for a minimum distance of 1.5 times the height of the wall;
- While the mechanical device is in operation no workmen shall be allowed to enter the building being demolished;
- The device shall be so located as to avoid falling debris; and
- The device when being used shall not cause any damage to adjacent structure, power line, other services etc.

4. आमजन की सुरक्षा /Protection of the public



a) Before any dismantling work is started, every sidewalk or road adjacent to the work likely to be affected shall be closed or protected.
b) Children and members of the public shall be kept out of the building and the adjoining yard.
c) If the structure to be demolished is more than two storied 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 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.

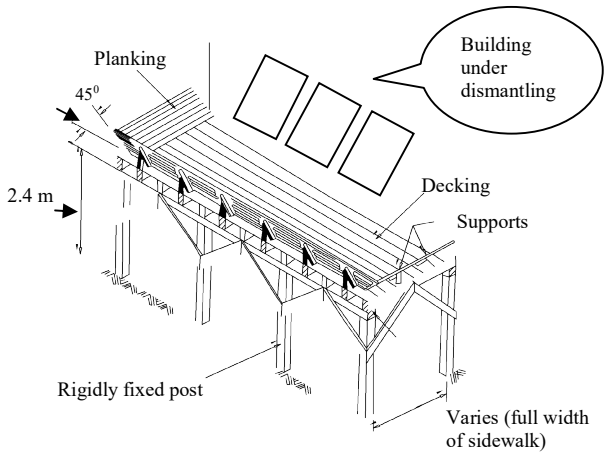


Figure - Side walk shed

d) A toe board of at least 1.0 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.
e) 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 sheeting/planking to prevent falling material from penetrating into the shed.
f) The roof of sidewalk sheds shall be capable of sustaining a load of 730 Kg/m^2. Only in exceptional cases, 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 1460 Kg/m^2. 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 600 Kg/m^2. The height of sidewalk shed shall be such as to give a minimum clearance of 2.4 m.
g) Sidewalk shed opening, for loading purposes, shall be kept closed at all time except during actual loading operations.
h) The deck flooring of the sidewalk shed shall consist of plank of not less than 50 mm in thickness closely laid and deck made water-tight.
i) All members of the shed shall be adequately braced and connected to resist displacement of members or distortion of framework.
j) 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 dismantling side of the property with movable bars as may be necessary for the proper execution of the work.
k) 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, 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.

5. विखंडन प्रक्रिया का क्रम /Sequence of dismantling operations

a) The dismantling work shall be proceeded with in such a way that:
   - It causes the least damage and nuisance to the adjoining building and the members of the public, and
   - It satisfies all safety requirements to avoid any accidents.
b) All existing fixtures required during dismantling 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.
c) Before dismantling 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.
d) 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.

e) All floor openings and shafts not used for material chutes shall be floored over and be enclosed with guard rails and toe boards.
f) The dismantling 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 dismantling of structure in sections, if means are taken to prevent injuries, to persons or damage to property.
g) Roofs or floors should generally, be dismantled first before dismantling the supporting walls/structural elements.

6. सामग्री को हटाना/Removal of materials

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.

6.1 Through chutes

a) 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.
b) 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.
c) Opening for the chutes shall not exceed 1.20 m in height measured along the wall of the chute and in all stories below the top floor such opening shall be kept closed when not in use.
d) To prevent the descending material attaining a dangerous speed, chute shall not extend in an unbroken line for more than two stories. A gate or stop shall be provided with suitable means for closing at the bottom of each chute to stop the flow of materials.
e) 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.
f) 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.
g) 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.

6.2 Through Holes in the Floor

a) 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.

b) 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.

c) 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.

d) 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. मलबा को हटाना/ Removal of Debris/Malba

a) As dismantling 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 dismantling work is being done.

b) The malba obtained during dismantling 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 that it is not toppling over or otherwise endangering the safety of workmen or passersby.

c) The malba shall be removed from the dismantling site to a location as required by the local civil authority. Depending on the space available at the dismantling site, this operation of conveying malba to its final disposal location may have to be carried out a number of times during the dismantling work. In any case, the dismantling 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 dismantling area tidied up.

d) 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.

e) Unauthorized use of the debris or malba in any work shall not be permitted. The re-leased materials classed as 'serviceable' shall be inspected by a competent person before being used.

8. दीवारों के विखंडन के लिए संरक्षा सावधानियाँ /Safety Precautions for dismantling of walls

a) 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 dismantling 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.

b) 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.

c) 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.

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

e) Before demolishing any interior or exterior wall within 3.0 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.

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

g) Walkways shall be provided to enable workmen to reach 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.

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

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

9. फर्श के विखंडन के लिए संरक्षा सावधानियाँ /Safety precautions for dismantling of floors

a) 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. The opening shall thereafter be increased to the desired width by suitable installments.

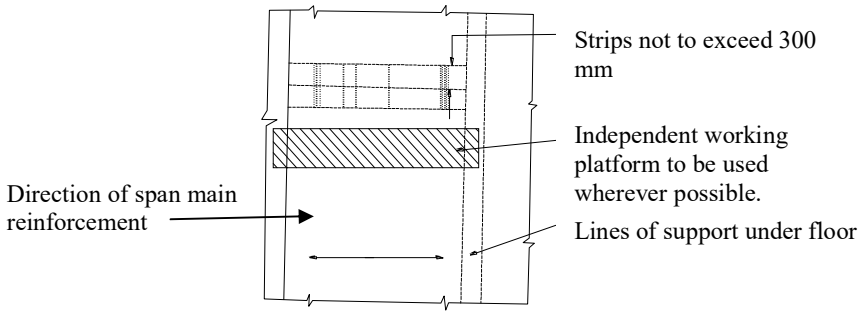


Figure - Floor Dismantling

b) Planks of sufficient strength, not less than 50 mm thick and 250 mm wide shall be provided.
c) Planks shall be so placed as to give workmen firm support to guard against any unexpected floor collapse.
d) 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.
e) 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.
f) The dismantling 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.
g) 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.

10. इस्पात संरचनाओं के विखंडन के लिए संरक्षा सावधानियाँ /Safety Precautions for dismantling of steel structures

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.

- Overloading of equipment shall not be allowed.
- Tag lines shall be used on all materials being lowered or hoisted up and a standard signal system shall be used and the workmen instructed on the signals.
- No person shall be permitted to ride the load line.
- 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.
- All structural steel members shall be lowered from the building and shall not be allowed to drop.

11. कैच प्लेटफॉर्म के लिए संरक्षा सावधानियाँ /Safety Precautions for Catch Platforms

a) In dismantling of exterior wall of multi-storied 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.
b) Such catch platform shall be constructed and maintained not more than 3 stories below the storey from which exterior wall is being demolished. When dismantling has progressed to within 3 stories of ground level, catch platform will not be considered necessary.

c) 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 1.0 m height. The parapet shall be constructed of the same specification as the platform.
d) Catch platform can be constructed of material other than wood also, provided such material is of equal strength.
e) Catch platform shall be capable of sustaining a live load of not less than 610 Kg/m^2.
f) The outriggers shall be of ample strength and shall not be spaced more than 3.0 m apart.
g) Materials shall not be dumped on catch platform nor shall such catch platform be used for the storage of materials.

12. यांत्रिक विखंडन के लिए संरक्षा सावधानियाँ /Safety Precautions for mechanical dismantling

When dismantling is to be performed by mechanical devices, such as weight ball and power shovel, the following additional precautions may be observed:

- The area shall be barricaded for a minimum distance of 1.5 times the height of the wall.
- While the mechanical device is in operation, no workmen shall be allowed to enter the building being demolished.
- The device shall be so located as to avoid falling debris; and
- The mechanical device when being used shall not cause any damage to adjacent structure, power line, etc.

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संदर्भ / REFERENCE

1	Indian Railway Work Manual
2	Indian Railway Bridge Manual
3	Indian Railway Permanent Manual
4	C E circulars on the subject
5	Text Book on construction Technology by Subir K. Sarkar
6	Unified Specification of Indian Railway
7	Various IS codes on the subject

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टिप्पणी / NOTES

गुणवत्ता नीति

रेलों में यात्री और माल यातायात की बढती माँग को पूरा करने के लिए गुणवत्ता प्रबंध प्रणाली में अनुसंधान, डिजाइनों और मानकों में उत्कृष्टता तथा सतत् सुधारों के माध्यम से सांविधिक और नियामक अपेक्षाओं को पूरा करते हुए सुरक्षित, आधुनिक और किफायती रेल प्रौद्योगिकी का विकास करना।

QUALITY POLICY

To develop safe, modern and cost effective Railway technology complying with Statutory and Regulatory requirements, through excellence in Research, Designs & Standards and Continual improvements in Quality Management System to cater to growing demand of passenger and freight traffic on the Railways.

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हमारा उद्देश्य

अनुरक्षण प्रौद्यौगिकी और कार्यप्रणाली को उन्नयन करना तथा उत्पादकता और रेल्वे की परिसम्पत्ति एवं जनशक्ति के निष्पादन में सुधार करना जिससे अन्तर्विषयों में विश्वसनीयता, उपयोगिता और दक्षता प्राप्त की जा सके।

यदि आप इस सन्दर्भ में कोई विचार और सुझाव देना चाहते हों तो कृपया हमें इस पते पर लिखें:

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Our Objective

To upgrade Maintenance Technologies and Methodologies and achieve improvement in productivity and performance of all Railway assets and manpower which inter-alia would cover Reliability, Availability, and Utilisation.

If you have any suggestion & comments, please write to us:

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