What is a Code of Practice?

The term 'Code of Practice' has a particular meaning under the Victorian Occupational Health and Safety Act 1985. Other codes of practice, such as the advisory codes developed by the National Occupational Health and Safety Commission, voluntary codes agreed in an industry, or codes adopted by other states or countries do not come within the meaning of the term used in the Victorian Act.

The Victorian Occupational Health and Safety Act 1985 provides for codes of practice "for the purpose of providing practical guidance to employers, self-employed persons and employees, ..." (S55[1]).

Codes of practice are developed by the Victorian Occupational Health and Safety Commission with assistance from the Occupational Health and Safety Authority. The Commission is made up of employer, union, expert and government representatives. The Commission recommends the code of practice to the Minister for Labour for approval after a period of public review of the draft, and consideration of any comment received.

A code of practice approved by the Minister for Labour comes into effect when "notice of approval is published in the Government Gazette or on such later day as may be specified in the notice,....." (S.55[6]).

A code of practice does not have the same legal force as regulations. Contravention of, or failure to comply with, regulations made under the Act is an offence (S.47[1]). Failure to observe a provision of an approved code of practice is not in itself a breach of the Act (S.55[8]).

However, in proceedings under the Act, where it is alleged that a person contravened or failed to comply with a provision of the Act or the regulations, a relevant approved code of practice is admissible as evidence. The court is required to take the matter as proved unless the person is able to show that compliance with the Act or regulations was achieved in some way other than that provided in the approved code of practice (S.56).

A health and safety representative is able to cite an approved code of practice in a Provisional Improvement Notice as a means by which the alleged non-compliance may be overcome. Similarly, an Inspector may cite an approved code of practice together with the relevant Section of the Act or regulations when issuing an Improvement Notice or Prohibition Notice.

In situations where it is impracticable to comply with the literal provisions of a code the employer must be able to show that an equivalent or better level of health and safety results from the alternative action taken.

In summary, an approved code of practice

- provides practical guidance;
- should be followed, unless there is another solution, which achieves the same result, or a better solution;
- is able to be used *in* support of the Act's preventive enforcement provisions; and
- can be used to support prosecution.

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Summary

This code provides practical guidance on the measures to be taken to prevent injury and disease to persons engaged in work on demolition sites, and to any other persons who might be exposed to risks arising from the demolition process.

This code is not intended to be a manual of technical or engineering procedures. Advice on technical procedures can be obtained from AS 2601 The Demolition of Structures or other relevant technical documents.

Part 2 Assessment and Planning outlines the responsibilities of the building owner, the employer and/or the occupier in the preparation, investigation, planning and execution of safe working methods. The hierarchy of control is outlined.

Guidance is also given on the formulation of a workplan to be developed in consultation with the relevant health and safety representatives. The employer is required to prepare a workplan to identify, assess and control the hazards arising from the demolition process in order to eliminate or reduce the risk.

Part 3 Health and Safety Provisions provides practical guidance for safety precautions needed to eliminate or control common demolition hazards. Guidance is also given on first aid and amenities. This section includes:

- first aid
- amenities
- provision of safe working platforms
- drugs and alcohol
- protection of openings and penetrations
- safe work on roofs
- asbestos
- synthetic mimeral fibres
- prevention of unauthorised entry
- provision of protective structures
- safe access and egress
- night time demolition
- adjoining buildings
- removal of debris
- fire prevention
- noise
- site security
- electrical safety
- protection of public roads, sewers and watercourses
- personal protective equipment
- frame cutting of steelwork
- manual handling.

Part 4 Demolition Methods describes some of the commonly used demolition methods from manual demolition to the use of heavy mechanical equipment and procedures to eliminate or control the hazards and risks involved in these methods. These include:

- general precautions
- manual demolition
- mechanical demolition
- demolition ball
- earth moving equipment and suspended floors
- demolition by wire and chain pulling
- machine mounted impact hammer
- power grapples and shears
- drilling and sawing
- mechanical demolition by pusher arm
- mechanical demolition by deliberate collapse
- demolition by explosives
- lift shafts.

Part 5 Training and Consultation gives guidance on the principles of training necessary to ensure that work can be performed safely and without risks to health these include:

- target groups
- objectives
- content
- special needs of employees
- evaluation and review
- training as a normal part of employment
- records of training.

This part also gives guidance on consultation to meet the legislative requirements of Section 31(2) of the Occupational Health and Safety Act l985. It includes:

- nature of consultation
- when to consult
- training in consultation
- consultation in hazard identification and analysis
- consultation in multilingual workplaces

This code also contains four appendices.

Appendix 1 contains a list of the statutory provisions, standards and codes that relate specifically to health and safety in the demolition industry. All relevant legislation must be observed.

Appendix 2 contains excerpts from the Victorian Building Regulations. These include:

- protection of adjoining buildings
- fire protection
- guarding excavations
- precautions during construction or demolition
- approval to demolish or remove a building.

Appendix 3 contains a building owner checklist and a safety checklist.

Appendix 4 is a list of general terms used in the construction industry.

1. Authority

This code of practice is approved pursuant to Section 55 of the Occupational Health and Safety Act 1985 (the Act) and shall have effect from 1st October 1991.

Section 21 of the Act requires an employer, among other things to "provide and maintain so far as is practicable for employees a working environment that is safe and without risks to health and to provide and maintain plant and systems of work that are so far as is practicable safe and without risks to health."

Section 24 of the Act requires that persons who design, manufacture, import or supply any plant for use at a workplace shall ensure, so far as is practicable, that the plant is designed and constructed so as to be safe and without risk to health when properly used. This duty extends also to persons who manufacture, import, or supplies any substance for use at a workplace, and includes provision for the testing, examination, and giving of information in respect of the plant or substance.

Section 23 of the Act requires that occupiers of a workplace take such measures as are practicable to ensure that the workplace and the means of access and egress from the workplace are safe and without risk to health.

2. Purpose

The purpose of this code of practice is to provide practical guidance on measures to be taken to prevent injury *and* disease to persons engaged in work on demolition sites, and to any ether persons who might be exposed to risks arising from the demolition process.

3. Scope

This code applies to the planning, preparation and conduct of occupational health and safety work practices in connection with the demolition of buildings and structures in Victoria. It is not a manual of technical or engineering procedures. Advice on these matters can be obtained from the relevant technical documents. Further guidance can be obtained from AS2601.

4. Definitions

"Competent Person" means a person whom the employer ensures has acquired through a combination of training, education, and experience has acquired the knowledge and skills enabling that person to correctly perform a specified task.

"Demolition" means the complete or partial dismantling or destruction of a building or structure, by planned and controlled methods or procedures.

"Occupier" means a person who has the management or control of the workplace.

"Framework" means a framework constructed of metal, concrete, timber, brick or other rigid materials.

"Immediate Environment" means the properties, including public thoroughfares and spaces, having common boundaries with the demolition site and where the property is a public thoroughfare, including the properties directly opposite the demolition ate and any other properties which may be affected by the demolition of the structure.

"Special Buildings" means buildings which, due to the nature of their construction, need particular care and include precast concrete panel and framed structures, stressed skin structures (ie. buildings that rely on the sheeting, cladding or decking to stiffen and restrain the structural framework) and slung structures (ie. floors) that are in some way suspended from an umbrella type framework supported from a concrete core.

5. Compliance with Statutory Rules

This code of practice makes frequent references to the use of cranes and the use of scaffolding.

Where it is intended to use cranes pursuant to any recommendations contained in this code of practice, the plant and systems of work must be in accordance with the Lifts and Cranes Act 1967 *(see Note 1*) and the regulations made under that Act.

Where it is intended to use scaffolding pursuant to any recommendations contained in this code of practice, the scaffolding and qualifications of persons erecting or dismantling the scaffolding must be in accordance with the Scaffolding Act 1971 *(see Note 2)* and any regulations made under that Act.

Where there is any uncertainty, enquires should be made to the Chief Inspector of Lifts and Cranes or to the Supervisor of Scaffolding Inspection as the case may be. These persons can be located in the Occupational Health and Safety Authority at Nauru House, 80 Collins Street, Melbourne, and can be contacted by telephoning (03) 655 6444.

Note (1) The Lifts and Cranes Act 1967 is currently under review Please see Appendix l.

Note (2) The Scaffolding Act 1971 is current under review. Please see Appendix l.

6. General

Prior to the commencement of any demolition the employer and/or occupier should ensure that an investigation of the structure to be demolished and the site is carried out by a person competent in all phases of demolition work, and a workplan prepared and documented. This workplan should include identification and assessment of any hazards and control measures to be implemented to address those hazards.

The employer and/or occupier should consider the potential for the site to have chemical contamination of the soil To assess whether site contamination is likely to be an issue, EPA Information Bulletin No. 269 (February 1990) "Interim Advice on Approaches to determine whether a site is potentially contaminated" should be consulted. Any contaminated soil should be disposed of in accordance with EPA Information Bulletin WM/91/Ol "Off site disposal of Contaminated Soil".

7. Hierarchy of Controls

There are many ways for employers to control the risks to health and safety in the workplace. Measures, which make the workplace safe, are likely to be more effective than measures, which protect the worker from a hazardous workplace. When adopting measures to control risks, the hierarchy given below should be followed in selecting the approach to be taken. Measures from the top of the hierarchy give better results and should be adopted wherever practicable. Measures from the bottom of the hierarchy are more difficult to maintain and should be regarded as interim measures until preferred ones can be implemented.

7.1 Elimination

This completely removes the hazard, or risk of exposure to the hazard Removal of the hazard is the ideal control solution, for example, removal of a noisy machine from quiet areas, using a non-hazardous chemical instead of a hazardous one, or changing the process to remove the need for a hazardous action.

7.2 Engineering Control

If a hazard cannot be eliminated the next preferred measure is to control the risk arising from it. This may include modification of tools and equipment, using enclosures, guarding. Local exhaust ventilation, or automation.

7.3 Administrative Control

Where a health and safety risk remains, administrative controls should be used. These involve introduction of work practices, which reduce risk by limiting the exposure of the employee to the hazard. These include measures such as reducing the number of employees exposed to the hazard, reducing the period of exposure, rotating jobs, adopting purchasing policies which take account of health and safety, special memos to be followed for use of hazardous chemicals or processes, and lockout procedures.

7.4 Personal Protective Equipment

Personal protective equipment should only be used where other measures have not been practicable. Efforts to remove health and safety risks using 7.1, 7.2 and 7.3 should continue It is often difficult to fully protect workers with personal protective equipment and it is always administratively difficult to maintain a personal protective equipment program. Workers can be required to wear several items, which affect comfort and restrict performance, and this reduces acceptance of the equipment. Where protective equipment is used, the employer should ensure that it fits the operator correctly, that training is provided on its need and use, and that it is serviced regularly.

8. Responsibilities

8.1 The Building Owner should:

- provide to the demolition contractor or occupier all available descriptions of the building to be demolished, including drawings, site survey, plan of services, extent, nature and location of hazardous materials, relationship to surrounding properties and any special elements such as trees and shrubs
- obtain the necessary approvals from planning authorities and notify the relevant authorities controlling essential utility services prior to the commencement of the work
- define the extent of the work
- reach an agreement with the contractor on a realistic period of time involved in the work
- notify adjoining owners of the proposed demolition and, if necessary, request their permission for use of adjoining air space
- where appropriate, ensure the inspection of buildings for the recording of existing defects
- ascertain the location of all services
- ascertain the location of all underground tanks, vaults, wells, voids and structures and certify that all chemicals, volatile fuels and gases have been deactivated
- remove vermin
- ensure immediately after vacating and before demolition starts that the vacant building is secure against fire risk
- where relevant, engineering computations on floor loadings should be provided

8.2 The employer and/or occupier should:

- plan for demolition work and select the method or methods of demolition
- inform the owner and all other relevant parties of the method or methods of demolition selected and equipment to be used
- take out all necessary work permits and forward notices to, and receiving notices from, the relevant statutory authorities
- nominate a person experienced in demolition to control the work at all times during which the demolition is taking place
- ensure an inspection of adjacent properties when necessary
- report to all relevant parties any change in the condition of adjacent properties during the demolition
- erect all appropriate hoardings, gantries and overhead protection barriers for the protection of the public and for the protection of the personnel on the site
- maintain the security of the site
- dispose of all material if required, and ensure that the demolition site is left in a dean and tidy condition
- provide appropriate change rooms, dining facilities and sanitary accommodation for workers
- comply with the appropriate codes of practice and regulations.

9. Workplan

The workplan, which should be developed in consultation with the health and safety representative/s, (if health and safety representatives have not been elected at this stage then the workplan should be made available to them on election) should identify hazards associated with the demolition process, make an assessment of those hazards and detail procedures to eliminate or control the risks arising from those hazards. Wherever possible priority should be given to the elimination or control of hazards at their source, or along the path between the source and the worker. The workplan should include but not be limited to, documentation of the following information:

(a) the location of the site on which the structure to be demolished stands

(b) the overall height of the structure above ground level and the least distance from the structure to each site boundary

(c) a brief description of the type of building (occupancy class), its structural support system and the principal materials of its construction

(d) a description of the methods of demolition proposed to be used and the number and types of major items of equipment proposed for implementing those methods

(e) a description of the methods proposed for handling and disposing of demolished materials and in particular, of hazardous materials

(f) methods of maintaining access and egress to workplace and site

(g) a description of the proposed sequence of carrying out the demolition works and an estimate of the time (in days) it is likely to take to complete all of each of the stages of the work

(h) a description of the proposed hoardings, scaffolding and fencing and of any overhead sidewalk protection

(i) any other plans, illustrations, written documents, or specialist reports as may be necessary to clearly define or substantiate the proposals made under items (d) to (g) above, and

(j) If it is proposed that mobile equipment be driven by operators on a suspended floor, itch (d) above should include the size and weight of each such piece of equipment and item (e) should include the proposed method of raising and lowering the equipment and of moving it from floor to floor. The workplan above should specify the support to be given to the suspended floor concerned and such other limitations on the operations of the equipment as may be necessary to maintain the safety of the operators and other site personnel.

(k) the location and condition of the following:

- drainage
- sewerage
- electricity gas
- water
- telephone cables
- radio and television relay lines
- hydraulic pressure mains
- liquid fuel lines
- lubrication systems
- process lines (chemical, acid)
- any hazardous materials - including asbestos and synthetic mineral fibres.

(l) The location and extent of any underground structures such as a basement, cellars, or storage tanks - the effect of the removal of the cross walls and the load of the superstructure on the stability of basement retaining walls should be considered; the position, depth and type of wells and underground storage tanks should also be determined as should the contents of storage tanks. The Health (Entry into Confined Spaces) Regulations 1984 *(see Note 3)* should be consulted before any work is done in confined spaces.

(m) The nature and extent of any retaining structures, which support adjoining ground or buildings - consideration should also be given to the existence of easements, right of way, boundary walls and other encumbrances.

(n) All areas of the site, including basements, cellars, vaults and other voids and dumps of material and rubbish should be examined to establish whether there are any items which could cause hazard arising out of fire and explosion: any previous use which could cause risk or danger from the decomposition of materials should be identified: the location and extent of any concentrations (dumps) of noxious, toxic, or other hazardous materials should be determined: an assessment report on the extent of these hazards should be completed prior to the commencement of demolition. (In the case of asbestos, the Labour and Industry (Asbestos) Regulations 1978 *(see Note 4*) should be adhered to. The removal of asbestos should be completed before demolition commences in that area).

In the case of synthetic mineral fibres wherever possible, removal should take place during the stripping out process.

(o) The general condition of structures on adjoining properties, particularly where these are close to or on the boundaries of the demolition site.

(p) The effect demolition may have on people working in adjoining properties or seeking access to and egress from those properties.

(q) All safety requirements should be determined during the planning stage and a description of safe working procedures and means to eliminate or control hazards should be listed in the workplan. This should include equipment for the rescue of injured persons.

Note 3 The Health (Entry into Confined Spaces) Regulations 1984 are currently under review. Please see Appendix 1.

Note 4 The Labour and Industry (Asbestos) Regulations 1978 are currently under review. Please see Appendix 1.

10. Engineering Investigation

In situations where:

- earthmoving machinery is to be used on suspended floors
- there is doubt concerning the design of the structural arrangements
- the structure has been weakened by deterioration, fire or other causes
- special buildings

then an engineering investigation should be carried out.

The investigation should be carried out by a qualified structural engineer experienced in the design and construction of reinforced concrete and/or prestressed concrete as appropriate.

Prior to commencement of demolition, the structural engineer should have investigated the structure by whatever means necessary and have determined as accurately as possible:

(a) the type of structural system involved

(b) the "as-constructed" details of the component members

(c) the current load-carrying capacity of the structure

(d) whether the proposed methods and sequence of demolition can be executed without causing unpremeditated collapse of the whole or part of the structure and

(e) any other details of the structure regarding strength, construction or contents which will influence the selection or demolition procedures given in the workplan.

A search for engineering details specifying size, type and configuration of reinforcement and the strength of materials (if available) should be made and the located documents referenced. Floor penetrations to facilitate construction or structural irregularities need to be located and identified prior to commencement of demolition.

To eliminate any uncertainty regarding the composition or quality of structural components, it may be necessary to use one or more of the following methods:

- core drilling
- electronic reinforcement location
- exposure of reinforcement

These methods should be performed under the direction of the practising structural engineer and any resulting loss of strength should be taken into account when ascertaining structural adequacy.

In assessing the current load-carrying capacity of structural members, the practising structural engineer should take into account:

- the strength requirements of the relevant structural Standards current at the time of construction and the strength and loading requirements of those now current
- degradation of the original properties of the materials used due to time, weathering, wear, or other deleterious causes
- the capacity of the structure as a whole and individual members to sustain superimposed loads without:

  (i) premature collapse of any member,
  or
  (ii) deforming to an extent which will lead to static instability of the member itself or to connected members.

To allow for impact and vibration during demolition a minimum impact factor of 1.5 should be applied, in addition to normal ultimate load factors, to the weight of the demolition machines and the weight of the falling debris. The resulting stress is to be within the allowable limits as set out in Australian Standard Structural Codes.

All phases of the proposed demolition method need to be considered in order to identify and isolate critical conditions. The sequence of demolition should be described in the proposed work method statement.

The demolisher should give every assistance to the structural consultant in the investigation and when requested, should provide any cores, load tests, chases, or opening up necessary to verify the load-carrying capacity of the structure, or the safety of the demolisher's proposals.

If propping is used to distribute loading to lower floors, the specified ratings of the prop manufacturer are not to be exceeded and the details of placement are to be specified by the practising structural engineer.

***Note**: Much of this information should be obtainable from the plans and specifications approved by the regulatory authority at the time of construction. However, even if these are available, verification by visual inspection combined with physical investigations, such as the cutting of chases and taking of sample cores etcetera, may still be required.*

11. Electrical, Gas, Water Services

One of the most important elements of the pre-job planning is the location of all utility services. All electric, gas, water, sewer, steam and other service lines not required in the demolition process should be shut off, capped, or otherwise controlled, at or outside the building line, before demolition work *is* started. In each case, any utility agency, which is involved, should be notified in advance, and its approval or services, if necessary, should be obtained. Any service retained for demolition should be adequately protected and if necessary arrangements made with the relevant authority to fully protect overhead wires.

12. First Aid

Prior to work commencing, the employer should make provisions for prompt medical attention in case of serious injury.

Rescue equipment for the prompt removal of an injured worker, as well as a communication system to contact any necessary ambulance service, should be available and readily accessible at the worksite. The telephone numbers of the hospital, physician, fire brigade or ambulances should be prominently posted. A first aider should be present at the site in accordance with the First Aid in the Workplace Code of Practice, and a first aid facility and first aid kits complying with that code should be available and accessible.

13. Amenities

Amenities and toilets in accordance with the Code of Practice for Building and Construction Industry Workplaces should be set up in a suitable and safe location.

14. Drugs and Alcohol

Employers should be aware of and sensitive to the consequences, at the workplace, of drug or alcohol abuse because of the nature of the hazards involved with demolition. Employers should encourage employees who have any drug or alcohol related illness to seek help from an appropriate referral centre. However, the final decision to seek help, if it is to be an effective one, should be made by the individual concerned.

Employers can do much to overcome the potential hazards of drug and alcohol abuse by exercising sensitivity, and by adhering to the following procedures.

In consultation with health and safety representatives (or the employees' nominee on sites where no health and safety representative exists):

- identify whether drug or alcohol abuse constitutes a workplace hazard

If drug or alcohol abuse is identified as a workplace hazard, then

- assess any factors in the workplace which may lead to an increase in the consumption of drugs or alcohol;
- establish control measures for those factors using the hierarchy of control measures.

When drug or alcohol abuse does constitute a workplace hazard, employers should ensure that any control measures are non-judgemental and are developed in consultation with health and safety representatives. Such measures could include:

- developing a policy of a drug and alcohol free work site which discourages employees from arriving on site suffering from the effects of drugs or alcohol;
- encouraging attendance at information sessions by representatives of Drug and Alcohol Abuse Referral Centres or Community Health Centres;
- encouraging individuals who are suspected of having an illness associated with drug or alcohol abuse to visit appropriate referral centres.

15. Safe Work Platforms

The occupier should ensure that safe work platforms are used where work cannot be performed safely from the ground or from solid construction. Solid construction, which is safe to work from, can be identified as such by the following characteristics:

- it has a supporting surface which is structurally capable of supporting people, material and any other loads that will be applied to it
- it is protected from open penetrations
- it is provided with protection at its perimeter and any other area necessary to prevent persons from falling
- it has an even and readily negotiable surface
- it is provided with a safe means of access and egress.

15.1 Scaffolding

Scaffolding is the most common type of working platform and is suitable for most demolition procedures.

Scaffolding should be not less than heavy duty classification and all scaffolds over 4.25m in height should be built by the holder of a certificate of competency for the erection of scaffolding. Access should be provided to all scaffolds.

Scaffolding should be based on solid foundations. Care should be taken to prevent damage to scaffolding planks and components from falling debris. Damaged planks and components should be removed and replaced by qualified scaffolders. Working platforms should be kept clear of debris.

Scaffolding should be dismantled progressively as the structure is demolished and should never be free-standing more than 4m above the last row of ties securing it to the building or structure Care should be taken to prevent damage to scaffolding from on site vehicles and earthmoving machinery.

All scaffolding should conform to the Scaffolding Act 1971 and Scaffolding Regulations 1974. (see *Note 5).*

Note 5. The Scaffolding Act 1971 and Regulations 1974 are currently under review. Please see Appendix 1.

15.2 Ladders

Ladders should only be used for works of a minor nature such as slinging or unslinging loads, connecting wire ropes for pulling etcetera.

Ladders should be secured top and bottom. Only one person should work from a ladder. Persons should not over reach when using a ladder. Oxy cutting or work involving the use of power tools should not be done from a ladder. Ladders should not be used near the perimeter of the building where there is a danger of falling out from the building or near lift shafts or stair-light wells where there is a danger of falling down them. All ladders should conform to the Scaffolding Regulations 1974 *(see Note 6).*

Note 6. The Scaffolding Regulations 1974 are currently under review. Please see Appendix 1.

15.3 Elevating work platforms

Elevating work platforms include scissors lifts, boom lifts, and cherry pickers, and can be suitable to reach difficult areas. Elevating work platforms should only be used on a solid level surface. The surface area should be checked to make sure that there are no penetrations or obstructions that could cause violent movement or overturning of the platform.

Oxy cutting bottles should not be carried in the platforms of boom type elevating work platforms due to the dangers of fire. When oxy cutting from elevating work platforms care should be taken that hot slag does not drop onto cutting hoses or bottles or onto any part of the elevating work platform vehicle. When using oxy bottles in scissors lifts the bottles should be secured in the upright position at the opposite end from the platform controls. A fire extinguisher should be in the scissors lift at all times when cutting.

Elevating work platforms should not be used in areas where debris may fall upon them. Persons should never enter or leave the platform whilst it is elevated. Safety belts should be worn and suitably attached when working in boom lifts and cherry pickers. All persons using elevating work platforms should be trained in their use.

Note: When gas and oxy is being used in a boom type platform a nominated person must be readily available to turn off bottles in case of an emergency at all times.

15.4 Personnel boxes (dog boxes)

Where it is necessary to use a personnel box attached to a crane to reach difficult to get at areas then all work should conform to appropriate provisions of the Cranes (Safety of Dogman) Regulations 1973 *(see Note 7*) of which some are:

- the box should have a Occupational Health and Safety Authority reference number
- the crane driver should have at least 32 months experience in driving the crane or an identical crane
- it should not be possible to operate the free fall facility in the hoist motion of the crane while the crane is supporting personnel
- the crane driver should remain in the control cabin at all times whilst the box is suspended
- the crane should be set up on firm ground
- cranes other than crawlers should be blocked at all times when using a personnel box
- a clearance of at least 6.4 metres should be maintained between the crane structure, hoist rope, slings and box and any live electrical conductors
- a "Notice of Intention to Use Dogman to Ride Load" form should be submitted to the Chief Inspector of Lifts and Cranes
- a dogman holding a certificate of competency should be in the box at all times it is being used
- persons using a personnel box should be attached by safety harness to the hook of the crane
- oxy cutting bottles or other dangerous substances should not be carried in the personnel box
- persons should only enter to leave the personnel box from the ground or solid construction (see Clause 12 for identification of solid construction)
- all work should conform to the Cranes (Safety of dogman) Regulations 1973.

N*ote 7. The Cranes (Safety of Dogman) Regulations 1973 are currently under review. Please see Appendix 1.*

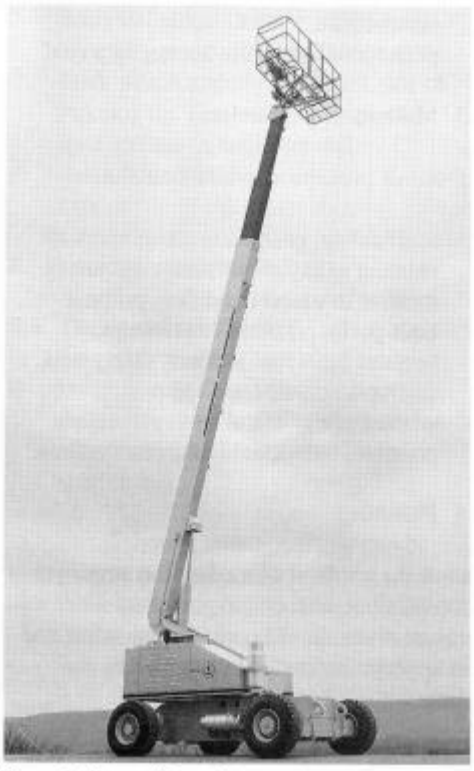

Figure 1. Boom lift used for reaching difficult areas safely.

Figure 2. Scissor lift in the fully extended position.

16. Protection of openings and Penetrations

All penetrations, in floors, roofs or in any other place where work may be carried out, should be covered with rigid material of sufficient strength to prevent any person or debris falling through, or guard rails and tow boards should be provided around the opening. (when covers are used they should be positively fixed to prevent dislodgment.)

17. Roof Work

17.1 General

Where it is not practicable to demolish the roof using mechanical means or to remove the roofing from work platforms below the roof then careful consideration should be given to the most suitable method of protection for workers engaged in the removal of the roofing.

17.2 Protection

Protection should be provided for all persons required to work on roofs where there is a danger of:

- persons falling through the roofing material
- persons falling from the edge of the roof
- persons falling where roofing has been removed
- persons falling through skylights or penetrations
- persons falling while accessing a roof.

17.3 Methods of protection

Methods of protection available include:

- scaffolding, guard-rails combined with existing safety mesh where the safety mesh is in sound condition, purpose built purlin platforms or trolleys, purpose built roof ladders, safety nets, catch platforms; and
- where none of the above systems are possible, individual fall arrest systems

17.4 Planning

Prior to the removal of roofing the employer in consultation with employee safety representatives should consider the safest and most appropriate method of removing the roofing.

Matters which should be considered include:

- safe access including the avoidance of tripping and slipping hazards and provision of ladders, cat walks and guard-rails, including the guarding of any opening on the perimeter
- condition and strength of the roofing material
- perimeter protection
- structural stability
- identification of fragile panels or skylights in solid roofs
- suitability of roof structure for the use of safety nets
- availability and strength of anchor points for static lines, inertia reels and lanyards
- means of rescuing persons from safety nets or safety harnesses
- methods of raising and lowering equipment and materials
- assessment of manual handling problems
- the particular health and safety issues where fragile materials will be encountered or the work involves removal of asbestos cement sheets or synthetic mineral fibre insulation
- crane access
- electrical safety including the location of nearby power lines and systems of work which comply with the Code of practice for Temporary Electrical Installations on Building and Construction sites
- experience of the removal crew

18. Protection Against Falling

18.1 The use of scaffolding

(a) Protection against falling at the perimeter of the building can be very effectively provided by the use of scaffolding.

(b) Mobile tower frame scaffold can be used to provide a safe working platform while installing safety nets.

(c) It is necessary that any scaffolding used is in conformity with the Scaffolding Act 1971 and the Scaffolding Regulations 1974[8].

(d) Certain types or arrangements of scaffolding may require special approval by the Supervisor or Scaffolding Inspection.

(e) Scaffolding components may be used to construct a mobile catch platform below the area where sheet removal is in progress. Where this method is used, close as practicable to the underside of the roof and in no case more than 1.8 metres below the working surface.

(f) The catch platform should be a minimum of 5.0 metres front to back and at least the width of the roof area being removed.

(g) The platform should at all times be positioned so as to maintain a minimum of two metres beyond all unprotected edges of the roofing work

18.2 Safety nets

(a) Safety nets can provide a satisfactory means of protection against falling while allowing roof workers maximum flexibility of movement

(b) Safety nets should be constructed in accordance with the British Standard BS 3913, Specification for Safety Nets.

(c) The use and maintenance of the nets should be in accordance with the British Standards Institution Code of Practice CP93, The Use of Safety Nets on Constructional Works

(d) A typical application of safety nets over the work area and perimeter is shown in figures 3(a) and 3(b).

(e) Workers installing the nets should be protected from falling. Ideally a mobile work platform (cherry picker, scissors lift) would be used but where such mechanical access is not possible the workers should have the protection of scaffolding or a safety harness and life line.

(f) Nets should be hung as close as is practicable to the underside of the work area.

(g) The safety nets should be installed with sufficient clearance to prevent contact with the surface below when subject to use.

(h) Safety nets should be installed only by trained competent persons.

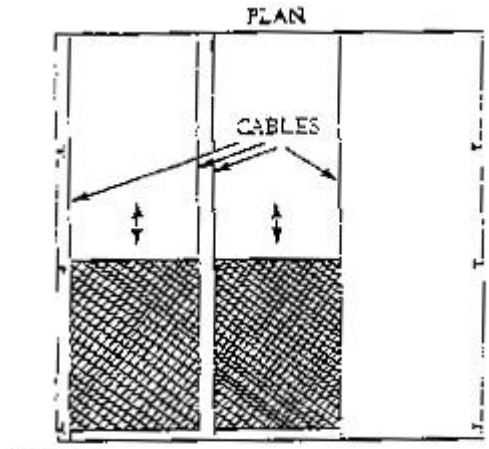

Figure 3(a)

Figure 3(b)

Cables are installed along the length of the building to cover each roofing bay. Safety nets are hung across these cables and moved along as the roofing work proceeds. Before commencing roof work, the perimeter nets should also be in position.

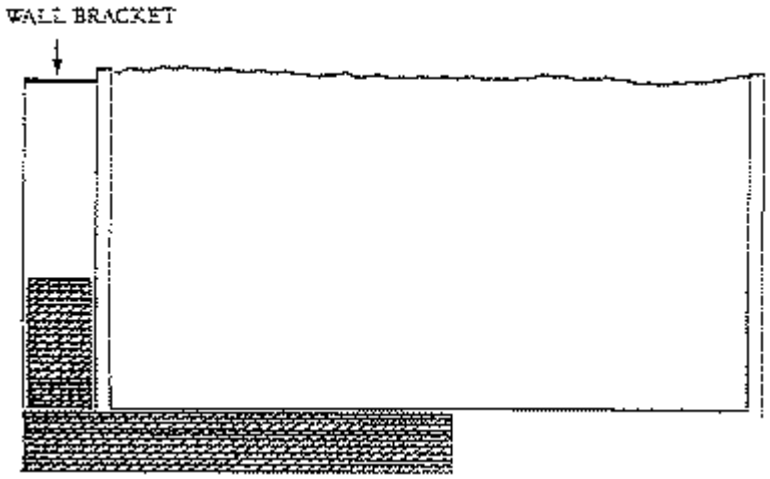

Figure 4(a)

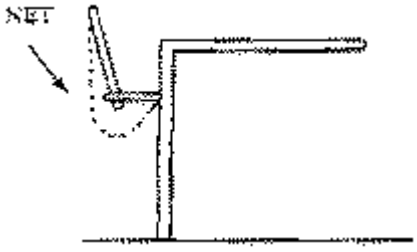

Figure 4(b): Wall bracket Detail

When erected, perimeter nets should project horizontally a minimum of (2+ H/5)m beyond the outermost working point above the net, where H = the vertical distance in metres between the net and the outermost working point above. In a normal roofing situation this would mean an outward extension of approximately 2.5 metres.

(j) Nets should be inspected immediately after installation, relocation or repair.

(k) Nets should be inspected daily for cuts and damage from abrasions, chemicals or heat Repairs should be made before any (unprotected) work above the net is resumed.

(l) Proper storage of nets is essential. Nets should be stored in dry, shaded areas; they can be hung or folded on pallets. Good air circulation is necessary.

(m) Nets can be seriously damaged by fire. Therefore combustible material should not be allowed to accumulate in suspended nets. Welding or oxy cutting should not be performed above safety nets except where precautions are taken to protect the net from any possibility of being damaged by slag.

18.3 Guardrails

(a) Where protection at the perimeter of the building or openings in the roof is provided by a guard rail system, the following recommendations should be observed

(b) The guardrail should be:

(i) 900 mm in height above the working surface

(ii) incorporate a mid-rail and toe board.

(c) Guardrails should be constructed to withstand a force of 0.445 KN applied at any point of the guardrail system.

(d) Where guardrail systems are intended to be used in conjunction with steel structures or tilt slab construction, designers and builders should plan for the guardrail and/or fixings be attached prior to the supporting part being raised from the ground.

(e) Figure 5 indicates one of various ways a guard rail system may be utilised. While this diagram represents a proprietary product, it is not intended to imply that other products could not also meet the recommendations of the Code in an equivalent or better way.

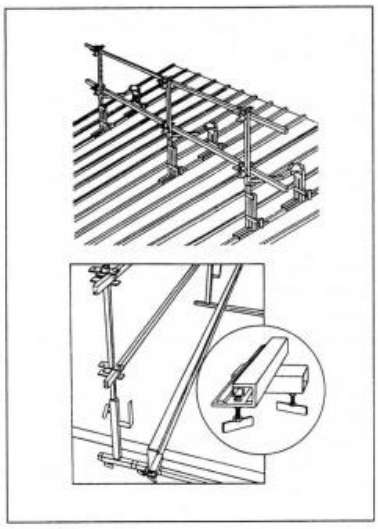

Figure 5: Deck guardrail for working on roofs (Courtesy of Deck Guardrail Systems Pty Ltd)

Figure 5: Deck guardrail for working on roofs
(Courtesy of Deck Guardrail Systems Pty Ltd)

18.4 Individual fall arrest systems

Systems of work that require the use of individual fall arrest systems should only be used where there is no practical safer alternative, eg scaffolding, guardrails around roofs with existing safety mesh in sound condition, purpose built purlin platforms or trolleys, purpose built roof ladders, safety nets, catch platforms.

(a) Inertia reel systems can be used to prevent falls where workers are required to carry out their work near an unprotected edge. Safety harnesses and lanyards can be used as travel restriction systems to prevent persons moving from safe to unsafe areas on the roof.

(b) Where safety harnesses, lanyards, static lines or inertia reel systems are intended to be used, it should first be ascertained that:

(i) Safety harnesses comply with Australian Standard AS 1891-Industrial Safety Belts and Harnesses.

(ii) Inertia reels or other self locking devices comply with British Standard BS 5062 - Self locking Safety Anchorage for Industrial Use.

(iii) Harnesses and other equipment are maintained in accordance with Australian Standard AS 2626-Industrial Safety Belts and Harnesses - Selection Use and Maintenance.

(iv) Static lines and anchorage's are designed for strength and movement restraint as described in this section.

(v) The persons required to use the equipment are properly trained their use

(c) Fall arrest systems should be designed so that when preventing a fall, the maximum distance a person equipped with a parachute safety harness would fall is within 1.8 metres.

(d) Full body harnesses of the parachute type connected to the lanyard or lifeline at the top dorsal position, should be worn An alternative attachment position is when a lifeline and rope-grab device is used an steeply sloping roofs and the user needs to manually operate the mechanism by having the device in front. In these circumstances the user can make the connection onto a D-ring on the side of the belt.

(e) Waist type belts should not be used for roof work

(f) The importance of having a minimum of slack in the lanyard or safety line between the person and attachment to the anchorage cannot be too strongly emphasised. The anchorage used should be as high as the equipment permits and the hazard of working above the point of anchorage is emphasised.

(g) When considering the use of inertia reels users should bear in mind that they may be less effective for certain applications, e.g., in arresting a person falling down the inclined surface of a pitched roof.

(h) Inertia reels are not designed for continuous support but become effective in the event of a fall, and should not be used as working supports by locking the system and allowing it to support the user during normal work.

(i) Vertical lifelines/droplines can be used in connection with work from boatswains' chairs and ladders. Where such vertical lifelines (drop lines) are used, not more than one person should be attached to any one lifeline.

(j) Vertical lifelines should have a minimum tensile strength of 22.2 KN and self retracting lifelines should have a minimum tensile strength of 13.3 KN.

(k) Independent fall arrest systems and safety harnesses should only be used with individual manufacturer's components known to be compatible.

(l) Except where verification of a lesser design load provides for a minimum factor of safety of six, static lines should have a minimum tensile strength of 22 KN and their anchorage's should have a design capacity of 22 KN. Intermediate supports for static lines should not exceed 4.0 metre spacings.

(m) Lanyards should have a minimum tensile strength of 22.2 KN.

(n) Snaphooks should not be connected to each other.

(o) Lanyards should not be used in conjunction with inertia reels.

(p) It is important that rescue of a worker who is suspended in a full body harness should occur within 20 minutes of the arrested fall. Accordingly, persons using safety harnesses should not work alone.

(q) **Pendulum Effect.** This is a potential hazard connected with the use of individual fall arrest systems. It can occur in two situations.

(i) Swing down. This danger relates to the use of inertia reels extended out diagonally in such a way as to make an extreme angle of the line with the roof's perimeter edge. The forces generated in an arrested fall over the edge in this situation cause the line to rotate back along the perimeter until it reaches a position perpendicular with the anchorage point of the inertia reel. By necessity as the line moves back to make the right angle with the roof's edge, its unsupported section must lengthen, thus dropping the attached worker further than the original (arrested) fall distance. If the length of the unsupported line equals the height of the building then the worker will hit the ground.

The pendulum effect can be easily avoided and in no way should this potential hazard discount the effective and important use of inertia reels. The following safe guards will ensure that the pendulum effect cannot occur.

Making sure that the inertia reel's anchorage point is more or less perpendicular to the line's position at the perimeter edge. A mobile anchorage is of assistance here.

The use of a perimeter guard rail would prevent any falls whatsoever over the perimeter edge.

(r) Constant supervision should be maintained at all times that individual fall arrest systems are being used to ensure that the systems are used correctly and that the workers are correctly attached to the system from the moment of leaving the access point to the roof to the moment of regressing from the roof.

(i) Swing back. In an arrested outward propelled fall particularly from a perimeter edge a person will swing back into the building structure. If there are obstructions in the path of such a swing that could cause an injurious collision, then the use of independent fall arrest systems in these circumstances should be re-assessed.

Note: These sects may also occur within the interior of the roof if the positioning of the inertia reel allows for a significant length of unsupported line connected to the user.

18.5 Purlin trolleys

(a) Trolleys are designed to travel on top of the purlins and support materials and/or the roof workers. Typical examples are shown in figures 7 and S.

(b) The purlin trolleys should be provided with a holding brake and a device to prevent their accidental dislodgment from the supporting purlins.

(c) Where it is intended that the roof workers be supported by the trolley, the trolley should be provided with suitable safety harness anchorage points.

(d) Prior to the placing of any purlin trolley an the roof structure, certification should be obtained from the Engineer responsible for the roof design' that the roof structure is suitable for use of the particular purlin trolley.

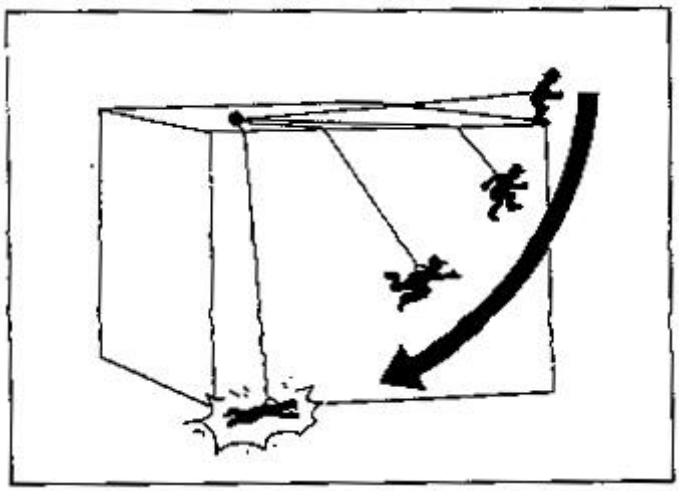

Figure 6 Pendulum effect: Following an arrested fall at this extreme diagonal, the inertia line moves back along the roof dropping the worker dangerously down to the ground.

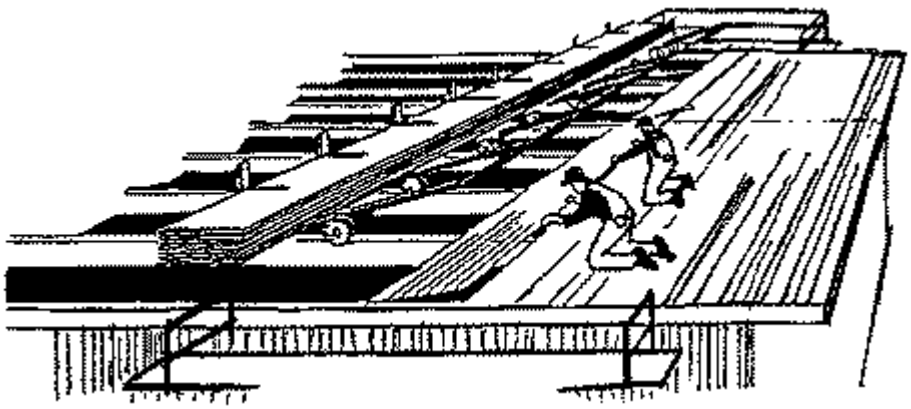

Figure 7

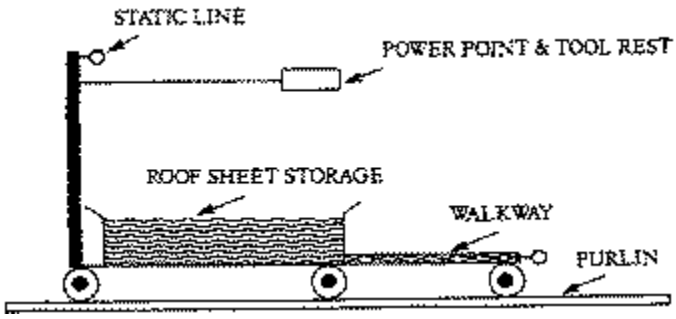

Figure 8: Roof Sheet Trolley (Courtesy of Portland Smelter Site)

18.6 Access

a) The person who has the management or control of a workplace where persons are employed to work on roofs has a responsibility to ensure that the access from the ground to the actual work area is safe and without risk to health.

(b) Assessment of access requirements should take into account tools and equipment the roof worker may be required to carry to and from the work site. Mechanical lifting aids should be provided where appropriate.

(c) Where temporary ladders are used for access:

(i) The ladders should be secured against displacement at the top and provided with non-slip feet.

(ii) Provision should be made to ensure that persons who use the ladder have a safe place to stand when alighting from the ladder.

(iii) The stiles of the ladder should extend at least 1m above the stepping off point.

(iv) Care should be taken that metal or wire bound ladders are not used in the vicinity of electrified power lines.

(d) Where access is via a permanently installed ladder, the ladder and any associated platforms and walkways should be in accordance with the SAA 1657 Code for Fixed Platforms, Walkways, Stairways and Ladders.

(e) For new roof installations or where extensive repair or replacement of existing roofs is planned, it is recommended that a ladder access tower be provided where the eave height is between six and fifteen metres above the ground and that a personnel and materials hoist be provided where the eave height exceeds fifteen metres.

(f) The means of access to the work site from the ladder or hoist landing platform should be arranged to eliminate the risk of injury. Special attention should be paid to any openings in the roof, such as smoke ventilation or box gutter sump installation, eg guardrails or secure covers.

(g) Where access involves provision of scaffolding, it is necessary for the scaffolding to comply with the Scaffolding Act 1971[9] and likewise where access is by personnel hoist, it is necessary for the hoist to comply with the provisions of the Lifts and Cranes Act 1967[10].

18.7 Fragile roofs

(a) Where not specifically identified as in sound condition, roofs should be assumed to be covered with a brittle or fragile material and the precautions recommended in this section should be adopted.

(b) Where it is necessary for removal work to be carried out on a roof containing fragile materials, the employer of persons required to carry out the work should:

(i) inspect the underside of the roof to determine the extent of fragile roof material, existence of any safety mesh, and the structural soundness of the roof and any safety mesh.

(ii) Provide temporary walkways where any person is required to work on or use as a means of access any part of the roof sheathed with brittle material where permanent walkways are not provided. The walkways should be at least 450mm in width, and should incorporate a guard rail. Where the slope of the roof exceeds one vertical to six horizontal, timber cleats of not less than 50mm by 12mm should be fixed *to* the top side of the walkway planks at distances not more than 350mm apart, centre to centre. The walkway should be adequately secured.

(iii) Provide temporary roof ladders of sufficient strength where any person is required to carry out work on or adjacent to any part of a sloping roof sheathed in brittle material.

(iv) Provide individual fall angst systems including anchorages for any person required to work on or adjacent to any brittle roof sheathing including work from roof ladders, wherever safety mesh, safety nets or similar fall protection has not been provided.

(c) Where the work involves removal of all or a major part of a roof sheathed with fragile material, and any of the following conditions apply, safety harnesses should be worn by all personnel engaged in the work:

(i) the pitch of roof exceeds 15 degrees

(ii) the perimeter of the roof is not guarded by:
a solid balustrade; or
scaffolding; or
a guard rail, which extends 900mm above the roof level at the perimeter, and includes a mid rail and toe board

(iii) protection against falling through the roof is not provided by permanently installed mesh.

The safety harnesses should be attached via an individual fall arrest device to a static line positioned above the ridge line

While engaged in the work, persons should only walk or stand over the purlin line.

18.8 Training and supervision for roof work

(a) The training and instruction given, which could include site instructions, "in-house" training programs, and components of formal training should be in appropriate languages and cover at least.

(i) The work method to be used for the unfixing, positioning and unloading of roof materials including access.

(ii) The method to be adopted to protect the employees against injury from falling.

(iii) The correct use, care, and storage of individual fall arrest equipment and safety nets.

(iv) The correct use, care and storage of personal protective equipment.

(v) The correct use, care and storage of tools and equipment to be used, including electrical safety.

(vi) Procedure to be adopted in the event of accident or injury.

(b) Supervision would need to:

(i) Ensure that only those employees who had received training and instruction were authorised to carry
out the work.

(ii) Include sufficient monitoring of the work to ensure that the agreed safe work practices were being adhered to including the use of fall protection and personal protective equipment

Note: For further information on roof work the Code of Practice for Safe Work in Roofs should be used.

18.9 Asbestos cement roofs

All asbestos cement roofs should be treated as fragile roofs.

The handling of materials contains asbestos should be in accordance with the Labour and Industry (Asbestos) Regulations 1978.

19. Prevention of Unauthorised Entry

Sufficient hoarding and barricades should be erected to prevent accidental or unauthorised entry to demolition sites Hoardings should be a minimum of 2.4m in height and should be closely timbered covered or sheathed.

Safety warning signs bearing the warning:

"**Danger Demolition Work"**

or something similar should be fixed in positions where they will be readily visible to persons approaching the site.

Where appropriate, safety warning signs bearing the warning:

"All Persons Entering Site Should Report To The Site Office"

should be fixed in positions where they will be readily visible to persons approaching the site. Clear direction signs should be erected from the 'Report to Site Office" signs to the site office.
Access openings in the hoarding should be provided with doors capable of being locked to prevent unauthorised entry after hours. Doors should not be able to be opened outwards into public areas.

20. Protective Structures

Throughout the demolition operations adequate safety should be maintained in public places adjoining the site. Safety of the public can be maintained by providing street closures, hoarding, scaffolding and other types of overhead protection either singly or in combination.

Where demolition sites adjoin public places and there is danger of debris falling, the preferred method of protection should be heavy duty perimeter scaffolding (see description below) and heavy duty coverways or gantries. If different methods are-used they should provide protection at least as effective as the preferred method.

Most public places including pavements and streets come under the control of the local council. The council should be consulted as to their specific requirements on hoardings, gantries, coverways and crane loading bays.

20.1 Heavy duty perimeter scaffolding

Where such scaffolding is used it should extend the full height of the structure being demolished.

The scaffolding should be provided with two working platforms, one located at the working level and the other not more than two lifts below (4.0 metres). Both platforms should extend the full width of the scaffolding, be closely boarded, abut the external part of the structure, and extend into openings sufficiently to prevent any materials from falling outside the structure. Both platforms should be covered with scrap carpet or like material and such material should extend up the rear of the platform to guard-rail height This method dust proofs the scaffold and makes it easy to throw small debris and dust back inside the building by lifting the carpet.

The external face and ends of the scaffolding should be sheathed with firmly fixed, heavy duty fire resistant shade cloth secured and arranged in such a manner as to contain rebounding materials and debris.

The scaffolding should be progressively dismantled so that the unsupported scaffolding does not exceed 4.0m above the last row of ties securing it to the building or
structure.

20.2 Heavy duty coverways or gantries

Coverways over public walkways or access ways for site personnel can be constructed from scaffolding, fabricated steel or timber and should be designed to withstand at least 5 kPa

Protection over public pavements usually requires the approval of the local council

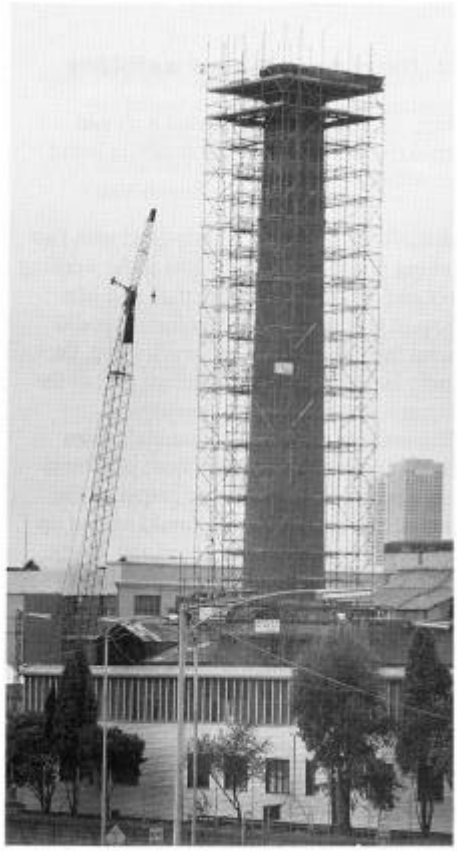

Figure 9: Heavy duty perimeter scaffolding used in the demolition of a chimney

Figure 11: Perimeter scaffold on a narrow pavement. The scaffolding is completely enclosed with heavy shade cloth to protect the public from falling debris

Figure 10: Scaffolding over footpath with lights

Figure 12: Perimeter scaffolding sheathed with old carpet to prevent debris from falling. The carpet is thrown back inside the building when demolition on that level is finished

Figure 13: Example of unsafe demolition work. Safe working platforms have not been provided and the clothing used gives too much exposure to the sun

Figure 14: Removal of debris

21. Site Sheds and Access Ways

All access and egress to site should be clearly marked as such and should be in areas protected from falling debris. Before demolition commences, site amenities should be set up in an area protected from falling debris. Amenities should conform to the Code of Practice for Building and Construction Industry Workplaces.

Site offices, and all amenities and access to and from them should be in areas protected from falling debris and should not be in any area that could be affected by premature collapse of any part of the building or structure. The level of protection should be not less than that afforded to public places.

22. Access and Egress (on Structures with Two or More Levels) to the Area Being Demolished

Where practicable a minimum of two accesses should be maintained to the work area to provide an escape route in the event of fire cutting off the primary access.

Access routes to work areas should be clearly marked and well lit and should be in areas protected from falling debris. Access routes should be free from debris or other materials. Penetrations and openings should be covered or guarded.

23. Night Time Demolition

Due to noise, vibration and other restrictions it is common for councils to limit demolition activities to outside business hours in commercial areas this often creates the need for demolition work to be performed in the dark

- Sufficient flood lights should be installed in such a manner to clearly illuminate the working area, its surrounds and any hazards that might be present. The floodlights should be positioned in such a manner to reduce shadows and dark areas.
- All access and egress to and from the workplace amenities, first aid room, office, storage sheds, rescue equipment and any other part of the site where workers may need to go as part of their duties, should be clearly illuminated.
- Provision should be made for sufficient emergency lighting to enable a safe evacuation from the site in the event of a power failure.
- Mobile communication should be provided at the workface to contact emergency services in the event of an accident.
- All lighting apart from battery operated backup systems should be protected by earth leakage devices in accordance with the Code of Practice for Temporary Electrical Installations on Building and Construction Sites.

24. Adjoining Buildings

24.1 Access

Access to adjoining properties should be agreed to beforehand and should be maintained throughout the demolition process. The level of protection should be not less than that afforded to public places.

24.2 Flooding

No part of the demolition process should cause flooding or water penetration of any adjoining building.

24.3 Structural integrity

No part of the demolition process should adversely affect the structural integrity of any other building

Consideration may need to be given to the use of shoring and underpinning, and to changes in the soil condition as a result of demolition.

Where the structure to be demolished adjoins other buildings, these buildings should be given lateral support not less than that given by the structure to be demolished Provision should be made for the erection of shoring before the existing lateral support is disturbed.

The layout of the shoring should be designed to enable any new building to be constructed with the least possible interference. The shoring should be checked for effectiveness as the demolition proceeds.

Care should be taken to ensure that other buildings are not adversely affected by vibration or concussion during the demolition process.

Special precautions may need to be taken in the vicinity of hospitals and other buildings containing equipment sensitive to shock and vibration.

25. Removal of Debris

Debris should be progressively removed from the site in such a manner so as to prevent:

- any build up of debris on floors that could effect the integrity of the floor,
- any build up of debris that could effect access and egress on site;
- any build up of debris that could become a fire hazard.

Demolished materials should not be allowed to fall freely outside the structure unless confined within a chute or similar enclosure. Demolished material should not be allowed to fall freely within a structure unless confined within a shaft, or similar enclosure, which is clear of obstructions to free fall.

25.1 Multi-storied buildings

Where demolished materials are allowed to fall freely through internal floor openings, the following should apply in addition to the above:

(a) At the working level, each opening should, during the removal of debris by machinery, be protected by an adequate vehicle buffer, and guarded by suitable barriers at all other times.

(b) At all levels below the working level, access to the areas through or onto which material is falling, should be prevented by the opening being enclosed from floor to ceiling by planking not less than 50 mm thick; or, signs and barricades being erected so as to prevent persons coming within six metres of such openings.

Where shafts or chutes are used for the removal of debris, care should be taken that debris falls freely and does not become jammed in the shaft or chute. Debris should be removed progressively and not be allowed to accumulate higher than the bottom opening of the shaft Overhead demolition should cease during removal of the debris.

Adequate measures should be taken to dampen the debris before, during and following dumping to prevent dust. In certain situations such as wheat silos dust can explode violently.) Large members should be cut to suitable sizes and lowered by crane. Where cranage takes place near public places the local council should be consulted as to specific requirements.

26. Fire Prevention

26.1 Fire protection services

A fire hydrant service or a fire hose reel service should be maintained at all times during the demolition of the building. Access to the fire protection service, including any booster fitting, should also be maintained.

If a sprinkler system is installed in a building to be demolished, it should be maintained in an operable condition at each storey as long as is practicable. Portable fire extinguishers should be kept in working areas at all times and maintained in an operable condition.

Note: Where the existing fire protection service is supplied by water storage tanks not available during demolition, a fire main, or dry riser, and associated hydrants will need to be installed and dismantled progressively ahead of the demolition.

26.2 Fire hazards from welding and cutting

Welding and cutting operations present a severe fire hazard unless strict precautions are taken.

In areas where the floor, walls or ground cover are combustible the area should be protected by spraying the area with water, spreading damp sand, and laying fireproof welding blankets or other suitable means of protection. In cases where a serious fire might quickly develop, a fire spotter should be assigned to the area. Fire extinguishing equipment must be readily available, and all employees trained in its use. Combustible debris should not be allowed to accumulate to the extent that it can become a fire hazard.

In cutting, the use of flammable fuel gases, and oxygen pose additional fire hazards. Pure oxygen is extremely dangerous - it can set fire to oil or grease even without flame or spark. Under some conditions it can explode. Oxygen regulators and fittings should never be oiled, greased, or cleaned with oily rags. Oxygen is no substitute for compressed air. It should not be used in pneumatic tools, on oil preheating burners, to start internal combustion engines, to blow out pipelines, to dust clothing, to create pressure, or for ventilation. Fuel gases can be just as dangerous as oxygen. At pressures above 104 kPa or uncertain mixtures with oxygen, acetylene can spontaneously explode.

Many modem synthetic building materials can smoulder for long periods before bursting into flame.

26.3 Burning

The deliberate burning of buildings should not be used as a method of demolition. Burning-off should not be permitted on demolition sites unless approval in writing is gained from the relevant regulatory authority. If permission to bum off has been obtained, care should be exercised in burning any material arising from demolition. Consideration should be given to prevailing winds and any fire restrictions, and adequate fire fighting facilities should be available at all times. All fires should be extinguished at least one hour before site personnel or an appointed fire-watcher leaves the site. Materials which give off toxic fumes or offensive smoke, should never be burnt.

Note: The regulatory authority may be the local fire service and the local government authority.

Note: It should be borne in mind that in certain environments such as wheat silos and storage bins, and under certain stimuli, deposits of combustible dusts on beams, machinery and other surfaces may be subject to flash fires, and suspensions of combustible dusts in air can explode violently (see SAA 24302).

27. Noise

Silencers should be used on all jack hammers. Compressors should be insulated against noise. In some areas the use of compressor' and other plant may be restricted to certain hours.

The requirements of the Health (Hearing Conservation) Regulations 1978 *(see Note 12*) should be adhered to.

Appropriate hearing protection should be worn in all noisy areas.

Note 12 The Health (Hearing Conservation) Regulations 1978 are currently under review. See Appendix 1.

28. Site Security

When the site is unattended all access to the site should be locked. All cranes, earthmoving machinery and plant should be locked to prevent unauthorised use. Oxy cutting gear and power tools should be in a locked room or container. For explosives see Clause 46.

The building or structure should be left in a safe and stable condition.

Any loose demolition material such as roof sheets should be secured in case of strong winds.

The site should be checked to ensure that no smouldering material is left that could burst into flames.

29. Electrical Safety

All electrical power tools, leads, site lighting and power supply on site should be in accordance with the Code of Practice for Temporary Electrical Installations on Building and Construction Sites.

Where perimeter scaffolding is to be erected near power lines the SECV or local electricity supply authority should be consulted before erection commences.

Before demolition commences all electrical wiring apart from the temporary electrical installations should be disconnected and rendered safe by an "A" grade electrical mechanic or where necessary the SECV or local electrical supply authority.

Where renovation demolition is involved and there is a possibility of live wires, the areas of danger should be clearly tagged or signposted "Danger Live Wires". The demolition contractor should be provided with a detailed plan of such areas.

30. Protection of Sewers and Watercourses

No refuse or waste should be allowed to enter public sewers or watercourses.

31. Protection of Public Roads

Precautions should be taken to minimise the spreading by vehicles of mud and debris on public roads. However mud and debris left on roads and footpaths should be removed.

32. Personal Protective Equipment

A number of hazards in demolition work require the use of personal protective equipment.

Personal protective equipment and clothing are those items of equipment or clothing worn by a worker to minimise or eliminate exposure to specific occupational hazards. Personal protective equipment and clothing is used to protect and safeguard people from dirty or hazardous conditions. Wherever possible priority should be given to the elimination or control of hazards at their source, or along the path between the source and the worker.

32.1 Selection of control measures

Control of risk should be achieved by using a hierarchy of control measures as outlined in Part 2 of this document.

32.2 Application of the control hierarchy

The employer should attempt to control the exposure of employees to hazardous substances by first assessing whether the most preferred control measure - elimination - is possible. If this control measure is not possible, the employer should assess whether the next preferred control measure can be achieved. This process of assessing the hierarchy of control measures should continue until the first control measure that is practicable can be achieved.

The control measures are not mutually exclusive and, in many circumstances, it will be appropriate for the employer to use a combination of control measures to reduce exposure as much as practicable.

It is most important that personal protective equipment be used as an absolute last resort to minimise exposure to hazardous substances, when all other control measures are impracticable or inadequate. When the hazard cannot be removed or adequately controlled, or removal or control is not practicable, personal protective equipment should be used.

A hazard is not eliminated by the use of personal protective equipment but the risk of illness and injury *is* eliminated or greatly reduced provided that the personal protective equipment is selected carefully and used properly.

Where personal protective equipment is planned to be used then a personal protective equipment program should be set up. This should include but not be limited to:

- identification and assessment of the hazard(s) - this provides the basis for selection of personal protective equipment
- assigning personal protective equipment to employees for their exclusive use where appropriate
- testing for proper fit
- regular cleaning and maintenance
- proper storage
- periodic inspection and repair
- periodic evaluation by the administrator of the program to assure its continued functioning and effectiveness
- supervisor training
- an employee training program in which employees can become familiar with the personal protective equipment, and in the proper use and the limitations of the equipment
- adequate supervision of any persons required to use personal protective equipment to ensure that it is used in accordance with SAA HB9.

32.3 Safe work clothing

Ordinary work clothing is appropriate for demolition work if it is clean and in good repair. Good fit is important, as loose-fitting clothing is easily caught in machine parts or on protruding objects. Work pants should not have cuffs or patch pockets when worn near welding or cutting operations, as slag can get caught in them.

Rings, bracelets and neckchains should not be worn on demolition sites.

Clothing which is saturated by oil, fuel, or a flammable solvent is easily ignited and should not be worn Welders should be equipped with flame-resistant welder's aprons which provide protection from sparks and slag. Welders protective clothing should conform to AS 1558.

Special clothing is required for employees handling certain hazardous materials.

32.4 Hand protection

Welding and cutting should be done with flame-resistant gloves.

Industrial gloves should be provided appropriate for the task being undertaken.

Gloves should be in accordance with AS 2161.

32.5 Foot protection

Shoes or boots should have steel safety toes and sturdy soles and be in accordance with AS 2210. Rubber boots with steel toe caps should be used by employees working in wet areas for extended periods of time.

32.6 Head protection

The wearing of safety helmets should be strictly enforced for all persons on site. All safety helmets should comply with AS 1801. A notice should be displayed at each main entrance to the site. The sign should display the following words in letters not less than 75mm in height.

SAFETY AREA

Safety Helmets must be worn beyond this point

32.7 Eye and face protection

Eye and face protective devices consist of safety glasses, goggles, face shields, welding goggles, and welding shields. Safety glasses and goggles are designed to protect the eyes from dust, flying particles, sparks, and splashing liquids. Face shields provide additional protection from the same hazards. Welding goggles and helmets should be used by all workers engaged in welding, and by all workers assisting in these activities. Welding goggles should conform to AS 1337 and 1338.

Contact lenses fail to provide any protection against dust or flying particles; consequently, goggles must be worn over contact lenses when these hazards are present. Eye protection should conform to AS 1336 and AS 1337.

32.8 Hearing protection

Day-to-day exposure to loud noise can result in a permanent loss of hearing. An effective health and safety program takes positive steps to eliminate this problem. Damage to hearing occurs when a person is exposed to excessive noise levels. Where practicable noise should be reduced by the use of silencers, insulation and other types of engineered solutions.

Often significant noise reduction is not possible on demolition sites.

The assessment and control measures should be in accordance with the Health Hearing Conservation) Regulations 1978.(see *Note 13).*

All hearing protection should conform to AS 1270.

Note 13 The Health (Hearing Conservation) Regulations 1978 are currently under review. See Appendix 1

32.9 Respiratory protection

Control measures are required whenever workers enter areas in which the concentration of dust, asbestos, or hazardous chemicals exceeds the concentrations set by relevant standards, or when workers enter areas deficient in oxygen. Exposure of employees to these hazardous atmospheres must be avoided whenever possible through engineering or administrative controls. Engineering controls, such as ventilation and spraying dusty areas with water, can often reduce the level of contaminants to the point where a respirator is no longer needed Similarly, administrative controls, such as changing work procedures to eliminate exposure to hazardous atmospheres, should be used whenever possible.

Apart from respirators to protect against nuisance dusts the use of respirators should be strictly controlled and the advice of an occupational hygienist should be sought as to the type and application of respirators or breathing apparatus for use in areas where toxic fumes, gas or oxygen deficiency exist A written control plan should be prepared including emergency evacuation procedures.

All employees who use respirators should be instructed in their use, and the nature of the hazards to which they are exposed should be explained to them. Employees should also be trained in the selection, use, fitting, inspection, maintenance and storage of respirators. Respiratory protection devices should be used in accordance with AS 1715. Where person have to enter confined spaces the Health (Entry into Confined Spaces) Regulations 198414 must be adhered to.

All respirators should comply with AS 1715 and AS 1716.

32.10 Individual fall arrest systems IFAS)

IFAS include safety harnesses, lanyards, inertia reels, and static lines.

IFAS should never be used as a substitute for safe work platforms such as scaffolding, elevating work platforms or solid construction protected by guardrails.

IFAS can be used to protect workers removing roofing in accordance with section 16 Roof Work.

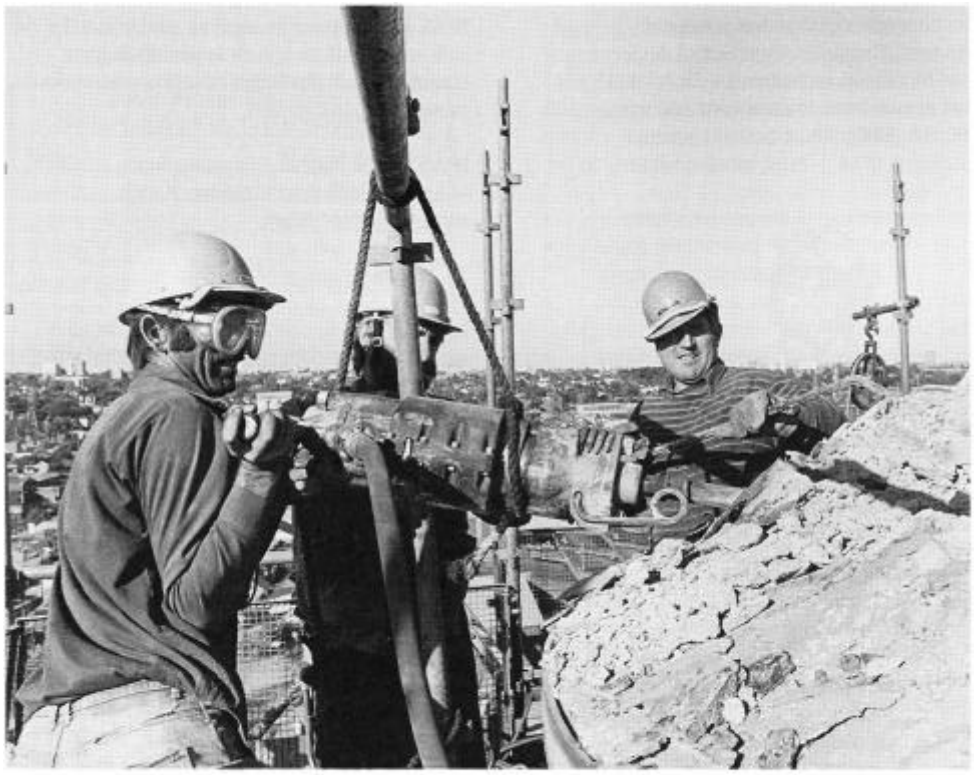

Figure 16: Pneumatic jack hammer being used to demolish a chimney. Note that the jack hammer is fitted with a silencer and its weight is supported by a rope from the scaffolding above. The scaffolding is protected by mesh brickguards to prevent debris from falling. Although the operator is wearing safety goggles and internal ear plugs the two demolition workers on the scaffold are risking serious eye and ear damage by not wearing protective equipment

Figure 17: Full face positive pressure demand air-line respirator

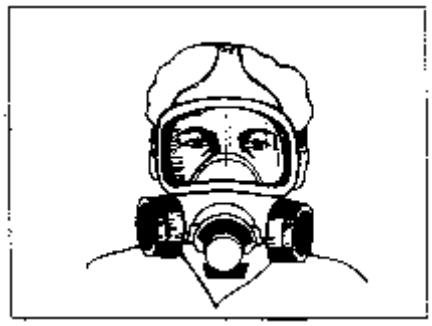

Figure 18: Full-face particulate filter (cartridge) respirator

33. Flame Cutting of Steelwork

In addition to fire explosion hazards, welders and cutters may be exposed to health hazards in the form of intense light rays and toxic fumes. The intense flame at the tip of the torch, or the electrode, emits light rays of three types: visible, infrared, and ultraviolet rays can cause "welder's flash". To prevent damage to the eyes, goggles or safety glasses with impact-resistant glass filters in accordance with AS 1338 must be worn during cutting. Tinted lenses drastically reduce visibility, and should only be worn while actually cutting. Face shields are required when there is a chance that spatters will fall in the worker's face.

To eliminate skin damage, workers should wear proper protective clothing. Synthetic fabrics should not be worn, because they melt when struck by hot slag. Cuffs and open pockets catch burning metals and should be eliminated Flame-resistant gloves and safety shoes must always be worn while cutting. Clothes must be kept free from oil and grease, because these present a fire hazard.

34. Fumes and Gases

Hazardous fumes and gases can be released into the air during welding and cutting. As seen in the table 2.1 some of these are released regardless of the material being cut: others depend on the type of metal or it's coating. The two hazards, which are considered most dangerous, are cutting through lead-based paint and cutting in the presence of degreasers. Cutting materials which have been cleaned with chlorinated hydrocarbon degreasing agents (eg trichlorethylene) can produce dangerous phosgene gas and their use should be avoided Adequate ventilation must be ensured before starting any cutting job.

34.1 Toxic fumes and gases produced by cutting torches

TOXIC FUMES AND GASES PRODUCED BY CUTTING TORCHES	
Source	**Chemical Produced**
Cutting	Carbon Monoxide
Cutting and Welding	Ozone
Welding Rods	Fluorides
Chrome-coated Fixtures	Chromates
Cadmium	Cadmium Oxide
Lead Pipe	Lead Fumes
Zinc	Zinc Oxide
Any material painted with lead-based paint	Lead Fumes
Any material which or was cleaned with chlorinated hydrocarbon degreasing agents	Phosgene Gas

34.2 Ventilation

Cutting in enclosed spaces, such as tanks, tunnels or small, closed rooms, demands particular attention to worker safety. A hazardous situation can develop because oxygen can easily be replaced by gases or toxic fumes. A fume educator is a hose attached to a cutting torch or welding gun through which fumes are exhausted at high velocity. If adequate mechanical ventilation cannot be provided, workers must be equipped with air-supplied respirators and a lifeline which is constantly watched by an outside observer. Cylinders must be kept outside the enclosed space, and gases should be shut off at the cylinder when work stops for more than a few minutes. A leaky hose or fitting in an enclosed space can easily result in an explosive or oxygen-deficient atmosphere.

All work in confined spaces should be done in accordance with the Health (Entry into Confined Spaces) Regulation 1984 *(see Note 15).*

Note 15 The Health(Entry into Confined Spaces) Regulation 1984 are currently under review. Please see Appendix 1

34.3 Containers that have held combustibles

Welding and cutting work on containers that have held combustible solids, liquid, gases, or dusts can result in fire or explosion if the containers are not entirely free of these materials. It is important that a rigorous cleaning process be undertaken and that instructions for cleaning be rigidly followed. Containers which have held any of the following materials are considered dangerous, and hot work should not be started before they are properly cleaned:

- petrol, kerosene, solvents, or light oils
- acids which react with metal and produce explosive hydrogen gas
- heavy oils, tars or solids which release combustible gases when exposed to heat
- combustible solids, finely divided particles of which may form an explosive dust cloud

As a general rule, any container which has held combustibles should be considered unsafe until proven otherwise by a qualified person. All procedures should be in accordance with AS 1674 and AS 1940.

While work has to be performed inside a container or vessel then work should be done in accordance with the Health (Entry into Confined Spaces) Regulations 1984 *(see Note 16).*

Note 16 The Health (Entry into Confined Spaces) Regulations are currently under review. Please See Appendix 1

35. Safe Use of Cutting Torches

35.1 Cylinder handling

Cylinders should never be dropped, dragged, or struck in any way. Pry bars and hammers must never be used on any part of the cutting torch system. Cylinders must be always be kept in an upright position and secured. When cylinders are transported or moved at the job site while connected for use, the cylinder valves must be closed, and the cylinders secured in place. When cylinders are hoisted by crane, they must be secured to a cradle or platform. Oil or grease should never be used on threads.

35.2 Cylinder storage

The contractor should set aside separate areas for the storage of fuel, gas and oxygen cylinders. These areas must be outside the range of falling debris, and away from heavily trafficked areas. Storage areas should be kept clear of combustibles, including fuels, and be designated as "NO SMOKING" areas.

Cylinders should not be placed where they might become part of an electrical circuit, such as near radiators and piping systems that may be used for grounding electrical equipment such as arc welding machines. Storage areas should be protected from direct sunlight. Cylinder storage areas should comply with regulations 505, 506, 507 and 508 Dangerous Goods (Storage and Handling) Regulations 1989.

35.3 Empty cylinders

Empty cylinders should be treated the same way as full cylinders. Empties should be stored in a designated area after the following procedure has been completed:

- cylinder marked ”EMPTY" or "MT"
- valve closed
- cylinder secured.

35.4 Torch set-up

Setting up a cutting torch requires careful attention to a derailed procedure. Only properly trained workers should set up this equipment. There should be no smoking while setting up the equipment.

The regulator is attached according to the procedure outlined by the manufacturer. Pressure regulators should be serviced and tested for accuracy on a regular basis. No oil or grease should be used on the threads.

35.5 Hoses

It is important that the regulators are used only for those gases listed on the regulator. Oxygen and fuel gas fittings are equipped with right-and left-hand threads to prevent accidental switching. To avoid confusion, oxygen, acetylene, propane, and other fuel gases should be called by their proper names, and not by "air" or "gas".

Once the regulators are in place, the hoses (red for fuel, black for oxygen) are connected and the torch is attached. Fittings must be not forced. Any sign of wear means a hose must be repaired or replaced at once. Hoses which are kept neatly coiled are less likely to become kinked, tangled, or get run over.

Torch valves and fittings should not be oiled or greased. Torches should be treated with the respect deserving a fine tool, and never as a slag hammer.

35.6 Leaks

A leak test can be performed to ensure that fittings and valves are correctly seated. The test involves pressurising the lines and applying soapy water on each fitting and valve. Leaks, which show up as bubbles, must be repaired. If, when the valve on a fuel gas cylinder is opened, there is a leak around the valve stem, the valve should be closed and the gland nut tightened. If this action does not stop the leak, the use of the cylinder should be discontinued, and it should be properly tagged and removed from the work area If the fuel gas should leak from the cylinder valve and cannot be shut off, the cylinder should be tagged and removed from the work area. If a leak develops at a fuse plug or other safety device, the cylinder should be removed from the work area.

35.7 Start-up procedures

The correct procedure for opening valves and lighting a cutting torch is as follows.

- The fuel gas cylinder should be opened between 3/4 and 1-1/4 turns. If a detachable wrench is required to open the valve the wrench must be left in place whenever the valve is open. In this way, the fuel gas can be shut off quickly in an emergency.
- Standing away from the face of the regulator, the operator should open the oxygen cylinder valve all the way. This prevents leakage around the valve stem.
- The working pressures on the regulators should be adjusted.
- After moving away from the cylinders, the operator should open the fuel gas torch valve 1/4 turn, and light the torch with a friction lighter. Serious injury can result from lighting torches with matches or cigarette lighters.
- The oxygen torch valve is then adjusted to set the flame.
- Gas lighters and/or matches should not be carried in the pockets of any person using flame cutting equipment. These have been known to ignite and explode causing serious injuries.

CAUTION: A squealing sound means that gases have flashed back into the torch. This fire could burn back into the hoses. Torch valves and cylinder valves must be quickly closed, and the cause of the flashback remedied before relighting the torch. Common causes of flashbacks are: improper pressures, kinked hoses, and loose, clogged, or overheated zips. Hoses that have been damaged should be replaced.

35.8 Shut-down procedures

During short breaks, only the torch valves need be shut-down. When the worker leaves the area, cylinder valves should be shut off as well. At the end of a shift, the following shut-down procedure should be followed:

- torch valves should be closed, fuel gas first;
- cylinder valves should be closed next, fuel gas cylinder first;
- the torch valves should be opened to release pressure then closed. This should only be done in a well ventilated area;
- the regulators, hoses, and torch should be removed and stored properly.

36. Manual Handling

All manual handling tasks which may be a risk to employee's health and safety should be examined and assessed and controlled if necessary, using a hierarchy of control measure. Comprehensive guidance on manual handling is available in the Occupational Health and Safety Regulations and Code of Practice for Manual Handling.

Except in special circumstances, buildings and structures should be demolished in reverse order to their construction. Demolition should be progressive, storey by storey and debris should be removed from site to avoid accumulation.

37. General Precautions

The building or structure to be demolished and all its components should be maintained in a safe and stable condition. Temporary braces, shoring, or guys can be added for stability.

Precautions should be taken to ensue that sudden weather changes do not affect the stability of the structure. Poorly braced structures can be blown over and loose debris can become airborne.

Debris should not be allowed to accumulate or fall onto floors to the extent that collapse could be caused. Debris should not be allowed to accumulate against walls to the extent that adverse lateral loads are imposed.

37.1 Stripping out

The techniques adopted for stripping out and for demolition should minimise the release of dust into the atmosphere.

Prior to the commencement of stripping or demolition in an area or structure, any existing accumulations of dust in that area should be watered down, or collected, placed in suitable containers and removed. Selection of an appropriate collection technique, such as vacuuming or hosing down, should take due account of the nature of the dust and the type of hazard it presents (explosive, respirating etcetera).

Dust generated during stripping, or during the breaking down of the building fabric to removable sized pieces, should be left damp until it is removed from the site or can be otherwise contained. The use of excess water for this purpose should be avoided.

Note: It should be borne in mind that in certain environments and under certain stimuli deposits of combustible dusts on beams, machinery and other surfaces may be subject to flash fires, and suspensions of combustible dusts in air can explode violently (see SAA 24302).

37.2 Synthetic mineral fibres

Synthetic mineral fibres are used extensively for insulation. Synthetic mineral fibres should be removed during the stripping out process. Controls should be put in place to minimize exposure. Personal protective equipment may need to be worn and dust should be suppressed by damping down. Removal should be in accordance with the Worksafe Code of Practice for Synthetic Mineral Fibres.

37.3 Asbestos

Where asbestos has been found the area should be isolated and the asbestos removed in accordance with the Labour and Industry 17 (Asbestos) Relations 1978 (see *Note 17)*

Note 17 The Labour & Industry (Asbestos) regulations 1978 are currently under review. Please see Appendix 1.

37.4 Broken glass

Where practicable the glass in windows, doors or other openings should be taken out, or the openings boarded up to prevent injury caused by broken glass.

38. Manual Demolition

Removal of the roof should be in accordance with Clause 16 and the Code of Practice for Safe Work on Roofs. Walls and gables should be demolished course by course and all work should be performed from safe working platforms. Workers should not work from the top of a wall or partition being demolished. Areas where debris will fall should be barricaded off and signs erected to prevent persons from entering before demolition starts.

Care should be taken not to overload floors. Where water is used to keep down dust the increase in weight of the debris that this causes should be taken into account.

Removal of roof trusses should be from safe work platforms. Care should be taken that removal of trusses does not cause instability of walls.

When jack hammering concrete floors, sufficient reinforcing steel should be left in position as protection against falling through the floor

Nails in timber should be removed or bent over flush to prevent puncture wounds.

39. Mechanical Demolition

All plant and equipment should be:

(a) operated by a competent person and where required by legislation that person should be the holder of a Certificate of Competency for the plant being used

(b) used and maintained as recommended by the equipment's manufacturer or supplier

(c) if intended to be used in an area where it could be struck by falling debris provided with overhead protection conforming to AS 2294

(d) all cranes used on site should be fitted with a load indicator and hoist limiting (Anti-Two-Block) device

(e) where appropriate, operated in compliance with the Lifts and Cranes Act 1967' and relevant regulations under the Act.

Where cranes are used to suspend loads that are to be cut and then lowered to the pound it is important that the load is accurately calculated; it may be necessary to cut samples for test weighing to determine the weight per unit length or area; the safe working load that the crane is capable of handling for the test weighing should be reduced by 50% to allow for miscalculations. A similar approach should be followed where weights cannot be determined with reasonable consistency and accuracy. Documentation issued for tare weights are to be retained for inspection on site.

Figure 19: Mechanical Demolition

40. Demolition Ball

Where demolition is carried out by a swing ball suspended from a crane, the following precautions should be observed:

- a minimum clear space of 6.0m or 50% of the height of the building or structure to be demolished, whichever is the greater, should be maintained
- an anti-spin swivel should be used between the hoist rope and demolition ball attachment
- the supporting ropes should be of such a length or so restrained that it is not possible for the ball to swing against any structure other than the structure being demolished
- the crane should be selected and used in accordance with AS 2550 and the boom head should be not less than 3.0m above the height of the building to be demolished
- cranes with hydraulic telescopic booms should not be used with demolition balls
- demolition balls should not be used in proximity to power lines
- it should be noted that certain manufacturers do not recommend use of their cranes for demolition ball duties or may approve this only conditionally, such as with restriction in the technique to be followed, the maximum boom jib length to be used, and like requirements
- the use of swinging ball demolition techniques should be restricted to cranes designed for arduous or heavy-duty service, such as converted dragline excavators. For a required ball mass and working height only a crane of excess capacity both in respect of working load and boom or jib length should be used.
- for guidance it is recommended that the mass of the demolition ball should be restricted to about 35% of the crane's safe working load based on the boom length and maximum radius of operation
- the ball should be positively fixed in such a manner to prevent it becoming disconnected by slack in the load line or other causes. The hoist line and ball connections should be checked at least twice per day
- care should be taken that no part of the structure collapses on the ball possibly pulling the crane over.
- only crane operators skilled in balling techniques should be used in this operation.

The ball should only be used in the ways described below:

40.1 Vertical drop ball

The ball is suspended above the building to be demolished and the holding brake released allowing the ball to fall vertically under gravity onto the building.

Sudden braking to arrest the fall should be avoided as this is likely to result in overturning of the crane or structural failure. The ball should always be allowed to free fall.

40.2 Swinging the ball in line with the boom or jib

An additional rope from a second drum on the crane is attached to the ball and is used to pull the ball in towards the crane. The pulling rope is then released allowing the ball to swing outwards, in the plane of the boom or jib, to strike the building.

The second rope is used to control and limit the outward swing of the ball. Care should be taken to ensure the stability of the crane.

40.3 Slewing boom or jib

By this technique the demolition ball is suspended some distance below the boom or jib head and the slewing motion of the crane is engaged causing the ball to swing in an arc and strike the building. This technique may impose high torsional and side loadings on the crane structure.

For a given mass of ball and attachments, the actual stress levels set up in. the crane structure may be governed by a number of factors including the following:

- length of boom or jib and operating radius
- distance of ball below the boom or jib head
- rate of acceleration of slewing motion
- velocity of the ball at impact and the impact resistance of the building or
- position of the boom or jib head relative to the demolition ball when the ball strikes the building
- rate of deceleration of slewing motion.

41. Earth Moving Equipment on Suspended Floors

41.1 Engineering investigation

Now that more monolithic reinforced concrete structures are demolished it has become common practice to equip an excavator with a hydraulic rock breaker and use it to break up the walls and floors while other earthmoving machines organise the rubble.

Due to the weight of such machinery, the vibration caused and the build up of rubble, careful planning and extreme care is needed to prevent premature collapse of the structure. Before any work starts an engineering investigation as in Clause 9 should be carried out

41.2 System of work

A safe system of work is to be devised in conjunction with the practising structural engineer, the main contractor and the demolisher and where possible the safety representative

41.3 Machine access

Rubble ramps to facilitate machine access from floor to floor (ie. a storey apart) should not be used. However rubble ramps of a lesser height for access from roughly adjacent floors may be acceptable if certified as safe by the practising structural engineer.

41.4 Lifting machines

Lifting operations to place machines onto the building should comply with all the relevant regulations under the Lifts and Cranes Act 1967

41.5 Propping

All propping used should be adequately braced in two directions. Care should be taken to ensure that the props used are structurally sound and can safely support the loads to which they will be subjected and that those loads do not exceed the manufacturer's specified ratings.

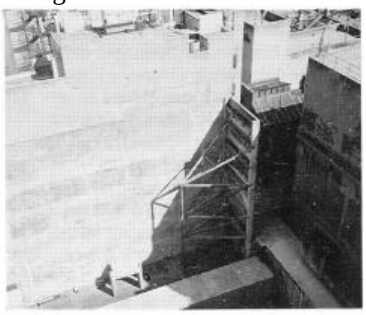

Figure 20: Facade support by propping

41.6 Removal of demolition debris

No floor or any member supporting it should be cut or removed until demolition above that floor has been completed and the demolished material removed.

Barricades and notices should be used to restrict access to the zone of demolition at all times during the progress of the demolition work

Lift openings other than the clean-out hole should be properly sealed off during the dropping of rubble.

Major items of demolition debris that would be dangerous to drop down a shaft, through an opening, or over the side of the building, should be lowered in a controlled manner.

Where machines are being used to tip rubble down a lift shaft or nominated rubble area, vehicle buffers should be provided to prevent the machine from falling over the edge. The buffers should be high enough to prevent the machine from riding over them and solid enough to stop a fully loaded machine running through or dislodging them.

41.7 Demolition of walls

When using hydraulic rock breaker to demolish walls, a minimum 900mm of the wall being demolished should be left intact above the floor level to provide a protective barrier at the perimeter of the building and around all lift wells, stair wells, light wells and any other place where persons could fall. The remaining wall can be safely demolished from the floor below.

41.8 Restriction of personnel

The area that machines are working in should be barricaded off to prevent other personnel entering the area.

41.9 Guideline proforma for demolition by earthmoving machines on suspended floors

Note: Information is required under the following headings

Site: _____
Address: _____
Principal Contractor: _____
Structural Engineer: _____
Owner: _____
Machine Details: _____
No of: _____
Mass: _____
Type: _____
Demolition Method: _____
Clearing Method: _____

Engineering checks:

1. Allowable rubble depth (mm): _____
2. Are machines to work over rubble ? (Yes/No): _____
3. Method of moving from floor to floor (Crane/Ramp): _____
4. If by ramp attach calculations for flooring loading: _____
5. Is propping, or floor strengthening required ? (Yes/No): _____
   If yes, attach details. _____
   _____
   _____
6. Are there any restrictions on machine travel? (Yes/No): _____
   i.e separation distance or 'no go' areas.
   If yes, attach details. _____
   _____
   _____
7. Attach details and limitations. _____
   _____
   _____

Supporting Documents

Included in this application are the following documents.

Certification of Operators

SUPERVISION

Nominated demolition supervisor

Nominated agent of the engineer

_____
Structural Engineer (signed)

_____
Demolisher (signed)

42. Demolition by Wire and Chain Pulling

Where mechanical demolition is to be carried out by chain or wire rope pulling, the pulling medium should be a securely anchored winch or a vehicle having a mass adequate to apply the required tension without sliding or lifting from the surface on which it is located.

No person should be on either side of the wire or chain or in any position where they could be struck by the wire or chain in the event of failure.

Walls should be cut into appropriate sections having regard to their height, width, weight and construction, and the chains or wire ropes should be attached to their respective sections prior to the first pull being made. The free ends of the chains or ropes should be left a safe distance from the structure.

Where reinforced concrete walls are to be chased to facilite felling, the horizontal chase should be made first, followed by any vertical chase.

Vertical reinforcing bars should not be cut until after the wall has been pulled over.

43. Machine-mounted Impact Hammer

A machine-mounted impact hammer is a larger and heavier duty form of the hand-held pneumatic drill, and may be pneumatically or hydraulically operated. As in the case of the lighter equipment, it is useful for breaking up massive construction such as concrete base slabs or the like, and for breaking larger pieces of debris into manageable sizes.

When used on vertical features such as columns or walls the columns or walls should not be of such a height as to create a risk of debris falling onto the machine or operator. When used on suspended floors precautions as in Clause 41 should be taken.

Figure 21: Machine-mounted impact hammer

44. Power grapples and Shears

Power grapples and shears are frequently hydraulically operated. Power shears may be used as an alternative to oxyacetylene cutting or the like to crop and cut through metal such as reinforcing steel or beams, particularly where there might otherwise be a risk of fire or where the more precise cuing possible with a torch is not required. Care should be taken to ensure that any member to be severed is either effectively supported or, if allowed to fall, in so doing will endanger neither personnel nor the remaining structures.

Power grapples may be used to handle waste material, either to move it about a site or to load other vehicles when disposing of the waste. As some debris resulting from demolition has a high density, care should be taken to avoid overloading the equipment both to avoid damage to the equipment itself and to avoid the risk of the machine overturning as a insult of instability induced by a heavy load.

Areas that shears are operating in should be kept clear of other personnel due to the danger of bolts flying when sheared.

45. Drilling and Sawing

Drilling and sawing are used either to remove part of a structure or to produce a potential fracture zone (eg by stitch-drilling, which is drilling a line of overlapping holes), and are frequently used in conjunction with other methods of demolition, particularly bursting. Diamond or tungsten tipped drills or saws are normally used. These methods can be employed in confined spaces, or for work that requires a high degree of accuracy, or where the noise, dust and vibration resulting from some other methods would be unacceptable.

They may be used to cut up floors and suspend slabs into manageable sizes, or to cut holes and slots in parts of a structure. Whilst this is being done the piece to be removed should be adequately supported. Use of these methods avoids damage to the surrounding area.

In order to flush out the resulting dust, and to cool the equipment during use, it is usual to employ running water in volume as a coolant. This needs to be borne in mind if it is proposed to adopt this method of demolition, and measures should be taken to provide a suitable supply of water, and to collect and safely dispose of the waste water that results. Care should be taken that any sparks produced during sawing do not constitute a health or fire hazard.

46 Mechanical Demolition by Pusher Arm

Mechanical demolition by pusher arm involves the progressive demolition of a wall using a machine fitted with a pusher arm exerting horizontal thrust.

The pusher arm should be used only when the equipment is on firm level ground. It should not be overloaded and should generally be used from outside and not from inside the building. No person should be within that distance of the building where debris is liable to fly.

The pusher arm should be made of steel. Pusher arms of other materials should not be used.

The cab of the appliance should be robust enough to withstand impact from flying debris and the cab windows should be of shatter-proof glass. Where necessary the machine should be provided with overhead protection conforming to AS 2294.

The height of the building should, in the first instance, be reduced to a height to suit the machine being used; then the height should be reduced progressively by pushing small sections to the ground.

Where this method is adopted for demolition of attached buildings, the structure to be demolished should first be detached by hand demolition.

The clear space in which the equipment is to operate should be a minimum of 6.0m.

The plant should be used only in accordance with the manufacturer's recommendations; on no account should the point where the pusher am is applied to a wall being demolished be more than 600mm below the top of the wall.

47. Mechanical Demolition by Deliberate Collapse

Mechanical demolition by deliberate collapse involves the removal of key structural members causing complete collapse of the whole or part of the building or structure being demolished.

Expert engineering advice should be sought before this method is used; it should be employed only on detached, isolated, reasonably level sites and where the whole structure is to be demolished. There should be sufficient space to enable equipment and personnel to be removed to a safe distance.

Sections of structure should not be pulled down by deliberate collapse in separate operations if instability of the remaining structure may result, causing a possible hazard to personnel on the site.

48. Demolition by Explosives

A specialist experienced in the controlled application of explosives for the purpose of carrying out the demolition of building structures should be consulted before deciding whether explosives are to be used for demolition. Account should be taken of the type of structure and its situation. An explosives specialist should be employed, experienced in this type of work

Tests may have to be conducted in a place remote from the actual demolition site. Matters which have to be considered are air shock, noise and dust if the explosives are to be used above ground. Also the type of day has to be considered. Air shock will vary with cloud cover.

Prior to the blasting of any structure or portion thereof, a complete survey should be made by a qualified person of all adjacent improvements and underground utilities.

When there is a possibility of excessive vibration due to blasting operations, seismic or vibration tests should be taken to determine proper safety limits to prevent damage to adjacent or nearby buildings or other property

Utilities require special consideration, and the proximity of underground and overground services should be carefully considered before blasting operations are carried out. Consultations should be carried out with the authorities responsible for concealed underground works (eg pipes, cables)

The preparation of a structure for demolition by explosives may require the removal of structural columns, beams, or other building components. This work should be directed by a structural engineer or a competent person qualified to direct the removal of these structural elements.

Extreme caution must be taken during this preparatory work to prevent the weakening and premature collapse of the structure.

The explosives specialist should decide the charges to be used and their placing. In the event of a misfire the area should remain cleared until the explosives specialist has dealt with the situation.

If, after blasting operations, a misfired charge is found during the subsequent removal of debris the area should be cleared and entrance restricted until the explosives specialist has rendered the misfire safe.

Buildings must not be demolished by explosives without the express permission of the Building Surveyor or other regulatory authority.

Handling and use of explosives must conform to the Dangerous Goods (Explosives) Regulations 1988.

Any persons using explosives must be holders of a red permit issued under the Dangerous Goods (Explosives) Regulations 1988.

Storage and transportation of explosives must be in accordance with the Dangerous Goods (Explosives) Regulations 1988.

49. Lift Shafts

49.1 Demolition and removal of lift shafts by hand.

(a) The lift cage should be taken to the top of the shaft and supported by steel beams. The steel beams should be inserted through pockets cut into the lift shaft walls.

(b) Prior to the removal of the lift cage and machinery room, the lift shaft should be fully decked over, at least at two levels. Lift doors should be welded shut from the outside or guarded by some other method. Electrical power to all areas of the lift machinery should be disconnected.

(c) Counterweights should be disconnected at ground or basement level and removed. The unwinding of the lift rope should be done in a controlled manner. It is not a good practice to leave lift cages at a lower level and allow lift weights to free fall down the shaft

The lift cage may be removed by crane or by cutting into sections. Safe working platforms should be provided for these procedures. Demolition of lift shaft walls should be done from internal scaffolding or a specially constructed internal platform at floor level. Walls should be progressively demolished onto each floor and the debris removed.

Where lift walls are to be demolished from the floor and the debris is to be dropped down the lift shaft then:

(i) a guardrail and toe board should be erected round the lift shaft walls

(ii) scaffolding should be erected with guardrails and toe boards protecting the working face

(iii) all work should be performed from behind the guardrails.

49.2 Demolition of lift shafts by mechanical means

(a) Lift cage and counter weights should be removed as above.

(b) If the lift shaft is on a perimeter wall, ensure adequate protection is provided for personnel or adjoining properties.

(c) Walls should be worked progressively down to a height of at least 900 mm above floor level to ensure a protective barrier is left in place to prevent machinery or personnel from falling down the open shaft.

(d) Machinery should be used in accordance with Clause 39.

50. Training

Proper training of all operatives involved is an essential element for the safe and efficient conduct of any undertaking.

As well as specific training relevant to the demolition operations, training will be necessary to enable operators to meet statutory qualification requirements.

Section 21(2)(e) of the Occupational Health and Safety Act Victoria 1985 requires an employer to provide such information, instruction, training and supervision to employees as are necessary to enable the employees to perform their work in a manner that is safe and without risks to health.

50.1 Planning Training

50.1.1 Target Groups Requiring Training

This Code sets out the requirements for training which occurs at the work place and includes specific training guidance for employees who:

- perform demolition work
- are being trained under supervision to perform demolition work; that is manual demolition work (see Cause 38) and mechanical demolition work (see Clause 39)
- compile the workplan to be used for the demolition work
- manage sites where demolition work takes place
- supervise demolition work
- are health and safety representative for those who perform demolition work
- are operators of particular types of machinery or plant for which they must be certificated under other Regulations and Codes of Practice referred to in this Code of Practice.
- purchase, distribute and maintain:
- equipment used in demolition work, and
- personal protective equipment to be used in demolition work.

50.1.2 Training Priorities

Decisions about training priorities, to determine who should be trained and in what priority order, should be based upon an analysis of the following sources of information in the context of the particular work under consideration:

- completion of risk identification, assessment and control procedures by which priority training needs are determined
- assessment of general training needs based upon the guidance given in this Code of Practice.
- analysis of the training requirements to meet criteria defined for the certification of operators of equipment or machinery called up by references to other regulations and codes of practice in this code of practice.

50.2 Objectives of Training

Agreed objectives should be developed for training programs, and should include the ability of employees to:

- demonstrate skill and awareness of healthy and safe work practices in the performance of both manual and mechanical demolition work
- ability to implement healthy and safe work practices in the workplace for demolition work
- ability to demonstrate knowledge of the provisions of the Occupational Health and Safety Act 1985, and other Regulations and Codes of Practice where they relate to demolition work practices, and this code of practice.

50.3 Content of Training

The content of training programs should:

- be developed in consultation with relevant employees and health and safety representatives
- should include the following where they are relevant to the demolition work employees are to perform:
- standards set out in this code of practice: that is, standards regarding safe workplatforms, scaffolding, ladders elevating work platforms, Personnel dog boxes, protection of openings and guard rails, heavy duty coverways or gantries, access to adjoining properties, structural integrity, site sheds and access ways, access and egress (on structures with two or more levels) to the area being demolished, electrical safety, Certificates of Competency for operators of demolition equipment, elements of mechanical demolition and demolition of walls.
- work processes: that is, the adherence to safety principles outlined in this Code of Practice in carrying out work processes such as the following - stripping out, manual demolition, demolition by explosives and removal of debris.
- procedures and systems: that is, attention to health and safety issues in training employees about safe systems of work, emergency rescue and first aid systems, night time demolition procedures, removal of debris, site security and restriction of personnel.
- hazards and risks: such as those created by utilities, roofing work, drugs and alcohol, flooding, fire, noise, welding and cutting, asbestos and broken glass.
- any other factors which may affect the health and safety of the employees requiring training.
- any other factors which may affect the health and safety of the employees.

50.4 Training methods

When developing and providing training programs, the employer should consider any special needs the trainees may have.

Training programs should be developed in consultation, and their structure, content and delivery should take into consideration the special needs of employees being trained. Such special needs include work experience, skills, age, gender, disability, literacy and languages spoken.

These special needs should be taken into account in the structure, content and delivery of the training. This may take the form of oral, or highly graphic training methods, or use of a language other than English.

The employer should ensure that the content of the training is clearly understood by the employees.

Training on-the-job should be provided by a competent person who is familiar with the plant or equipment and the duties to be performed. Trainers should also have demonstrated healthy and safe work practices and successfully completed appropriate trainer training.

50.5 Evaluation and Review of Training

Training should be evaluated and reviewed in consultation with relevant employees and health and safety representatives, in order to ensure that the content of the training programs is clearly understood by all employees and the overall objectives of the training programs have been achieved, as well as to identify when further training is required.

50.6 Training as a Normal Part of Employment

Training programs should be organised and delivered so that they occur as a normal part of employment and usually during normal working hours.

50.7 Records of Training

Training should be recorded in a format which enables on-going program evaluation and review, and fulfilment of relevant statutory requirements.

51. Consultation

51.1 Duty to Consult

Section 31(2) of the Occupational Health and Safety Act 1985 states -

An employer shall –

" (c) consult health and safety representative on all proposed changes to the workplace, the plant or substances used in that undertaking or the conduct or that undertaking being changes that may affect health safety and welfare at the workplace, "

51.2 Nature of Consultation

Consultation on proposed change is a positive approach to the prevention of workplace injury and disease. The health and safety representative(s) and the employer should develop procedures for the consultative process

For consultation in the workplace to be effective, health and safety representatives and employees should have access to relevant information. The Act (Section 31(2)(a) requires the employer to permit a health and safety representative access to a broad range of information, including information on hazards or potential hazards at the workplace; and work conditions, work organisation, plant, equipment or materials used in the workplace. Section 21(4)(e) requires employers to provide information to employees with respect to health and safety at the workplace.

Consultative procedures should allow enough time for the health and safety representatives and the employees to consider the implications of the information, and to discuss it with the employer.

51.3 When to consult

The Act requires the employer to consult with health and safety representative before any changes are made to the workplace which may affect the health, safety and welfare of the employees. By addressing the health and safety implications of proposed change at the planning stage, unintended harmful consequences to employees' health and safety may be avoided.

Consultation with the health and safety representative should take place as early as possible in the planning for the introduction of changes to the workplace, the plant or substances used or the conduct of that undertaking.

Consultation with the relevant health representative should continue throughout the process from the identification of the need to purchase plant, through the design, operation, and repair and maintenance of that plant

Consultation with the health and safety representative should also occur when a particular control measure is being proposed and when the effectiveness of implemented control measures is being reviewed

Consultation with employees should also take place as early as possible in the introduction of changes to the workplace, to enable their experience and expertise to be taken into account at a time when it can be utilised.

51.4 Training

The employer should ensure that through the consultation process the training implications for all employees including management are identified

51.5 Consultation during hazard identification and analysis

Consultation should occur when the employer is identifying hazards, when determining the approach and method to be used to assess the hazard, when the employer decides to implement a strategy and when decisions are being taken on measures to control risks.

51.6 Multilingual Workplaces

The employer should establish ways for non-English speaking employees to be included in consultation, to join in discussions and consider ways in which hazards can be controlled.

The following methods may be used for consulting effectively with workers who have limited technical or language skills:

- organise consultation in groups which share the same language
- use interpreters if necessary
- use audio/visual aids in appropriate languages
- when speaking English keep it simple, and use complete sentences
- give only the essential points
- check for understanding
- demonstrate the point, if possible
- use outside services which provide language support (such as the Occupational Health and Safety Authority Bilingual Information Program)

Appendix 1 Statutory Provisions, Standards and Codes

The conduct of demolition usually involves the need for compliance with acts or regulations which relate to Occupational
Health and Safety. Where any uncertainty exists enquires should be made at the planning stage to the Victorian Occupational Health and Safety Authority.

There are also approved codes of practice and other standards and codes available which cover practical guidance in health and safety aspects of demolition work.

Titles of appropriate acts, regulations and codes are shown below. However these are subject to change and checks should be made with the Occupational Health and Safety Authority.

Statutory Provisions

Occupational Health and Safety Act 1985
*Scaffolding Act 1971 and Regulations 1974
*Lifts and Cranes Act 1967
*Occupational Health and Safety (General Safety) Regulations 1986
*Occupational Health and Safety (Machinery) Regulations 1985
Occupational Health and Safety (Manual Handling) Regulations 1988
Dangerous Goods (Placarding of Workplaces) Regulations 1985
*Cranes (Safety of Dogman) Regulations 1973
*Health (Hearing Conservation) Regulations 1978
*Health (Entry into Confined Spaces)Regulations 1984
*Health (Harmful Gases, Vapours, Fumes, Mists, Smokes and Dusts) Regulations 1984
Occupational Health and Safety (Issue Resolution) Regulations 1989
Dangerous Goods Act 1985
Dangerous Goods (Explosives) Regulations l988
Dangerous Goods (Flammable Liquids) Storage Regulations 1988
Dangerous Goods (Storage and Handling) Regulations 1989
Labour and Industry (Asbestos) Regulations 1978

Furthermore, the asterisked Acts and Regulations are currently under review and will be replaced in due course. If reference to these Acts and regulations is required, check to see whether they have been replaced by newer legislation.

Codes of Practices referred to in this document are listed below

First Aid in the Workplace
Manual Handling
Temporary Electrical Installations on Building and Construction Sites
Safe Use of Cranes in the Building
Construction Industry
Safe Work on Roofs

.

The Australian Standard Codes referred to in this document are listed below.

AS 1270	Acoustics - Hearing Protectors
AS 1319	Safety Signs for the Occupational Environment
AS 1336	Recommended Practices for Eye Protection in the Industrial Environment.
AS 1337	Eye Protection for Industrial Application.
AS 1338	Filters for Protectors
AS 1558	Protective Clothing for Welders
AS 1657	Fixed Platforms, Walkways, Stairways and Ladders
AS 1674	Fire Precautions in Cutting, Heating and Welding Operations
AS 1715	Selection, Use and Maintenance Of Respiratory Protective Devices
AS 1716	Respiratory Protective Devices
AS 1801	Industrial Safety Helmets
AS 1891	Industrial Safety Belts and Harnesses
AS 1940	The Storage and Handling of Flammable and Combustible Liquids (known as the SAA Flammable and Combustible Liquids Code)
AS 2161	Industrial Safety Gloves and Mittens
AS 2187	Explosives - Storage, Transport and Use
AS 2210	Safety Footwear
AS 2294	Protective Structures for Operators of Earthmoving Machines
AS 2430.2	Combustible Dusts
AS 2550	Cranes - Mobile, Tower and Derrick Selection
AS 2601	The Demolition of Structures
AS 2626	Industrial Safety Belts and Harnesses - Selection, Use and Maintenance
AS 3600	Concrete Structures
SAA HB9	Manual of Industrial Personal Protection

Other Codes

CP 93	BSI Code of Practice for the Use of Safety Nets on Construction Works
BS 3913	British Standard for Safety Nets

Appendix 2 Excerpt from the Victorian Building Regulations

This appendix contains excerpts from the Victorian Building Regulations, under the Building Control Act 1981, relevant to this code of practice.

1. Victorian Building Regulations, Clause 8.6

Approval to Demolish or Remove a Building

1.1 Form of application

" 8.6(1) An application for approval to demolish or remove a building should be in accordance with Form 5."

1.2 Information that may be required

"(2) Without limiting the power of the Co-ordinator he may require all or any of the following information to be lodged with an application for approval to demolish or remove a building:

"(a) an outline and a description of the building or part of the building to be demolished or removed;

"(b) an allotment plan showing the location of the building in relation to the boundaries of the allotment and such other features as adjoining buildings or other buildings on the allotment, streets, footpaths, crossings;

"(c) where a part only of the building is to be demolished or removed, computations or other information to show that the remainder of the building will comply with the provisions of these Regulations either as it remains after the proposed demolition or removal takes place or after other works are carried out;

"(d) information showing the position and description of hoardings, barricades, temporary crossings, protective awnings and outriggers;

"(e) details of any proposed work for the protection of property and the public required by Parts 12 and 13;

"(f) a written description of the demolition procedure; and

"(g) with the exception of buildings exempted by Regulation 13.3 evidence that-

"(i) the demolisher is in possession of a public liability insurance policy for not less than $1 million in respect of the
proposed demolition work and that the policy will not expire during the demolition work;
"(ii)*****
and
"(iii) the demolisher has the necessary knowledge experience, equipment and storage facilities to properly conduct the demolition Operations.

3. Victorian Building Regulations

Group III - Precautions During Construction or Demolition

Part 12 - Precautions During Construction - Protection of adjoining Property and Public Protection to be provided

"12.1(1) Before and during the carrying out of any building work -

"(a) protection should be provided if and when required by the building surveyor, and

"(b) within 3m of any steel alignment, precautions should be taken to ensure the safety of the public using the street and particulars of such precautions should be approved before any building work is commenced.

When protection may be dispensed with

"(2) The requirement of sub-regulation (1) (a) should not apply in the case of underpinning if the building surveyor is satisfied that the foundation of a building on an adjoining property consists of hard stable rock."

"(3) The notice required to be given by the owner to the adjoining owner by section 147(1) of the Act should be in accordance with Form 6 and should be accompanied by three copies of Form 11

Response from adjoining owner

"(4) A notice required to be given by an adjoining owner agreeing or disagreeing with the proposed protection works or requiring more information should be in accordance with Form 11.".

Guarding of excavations

"12.3 All excavations should be fenced or otherwise guarded against being a danger to life or property."

Fire protection during construction

"12.4 During construction of a building which is to exceed 25.0m in height above ground level other than a mast, pole, aerial or similar structure-

"(a) a fire main not less than 100 mm nominal size fully charged with water should be provided;

"(b) a fire main should be extended upwards along with the construction and be available for use not more than 2 storeys below the highest formed floor level of the building;

"(c) a fire main should be fitted with a 63 mm hydrant and a fire hose reel containing 36 m of 20 mm hose at each storey by the fire main;

"(d) the fire main should be equipped with the necessary valves and connections at ground level for the connection of a fire brigade booster pump;

"(e) the fire main should be provided with a header tanks, pump or other means so that the topmost hose reel should be capable or operating at an inlet low pressure to the reel of not less than 70 kPa for a period of at least 15 minutes when it is the only hose reel that is in operation; and

"(f) the locations of required fire mains, hydrants and fire hose reels should be subject to the approval of the chief officer."

4. Victorian Building Regulations, Clause 8.8

Group III - Precautions During Construction or Demolition

Part 13 Demolition

Interpretation

"13.1 For the purposes of these Regulations a demolisher means any person who demolishes or removes or authorises the demolition or removal of any building or part thereof."

Responsibility for Demolition

"13.2 The demolisher should be held responsible for the whole of the work referred to in the approval to demolish including any work carried out by sub-contractors."

Application

"13.3 This part should apply to demolition works on all buildings except those works which in the opinion of the buildings surveyor are of a minor nature and the demolition of single story Class I or X buildings which are not closer than 6 m to a street alignment."

Precaution before and during demolition

"13.4 Precautions before and during demolition should be as follows:

"(a) the demolition should not be commenced until precautionary measures have been inspected and approved.

"(b) Before demolition is commenced and also during the progress of such work all electric cables or apparatus which are liable to be a source of danger,. other than a cable or apparatus used for the demolition works should be disconnected.

"(c) During the progress of demolition the work should be under the continuous supervision of the demolisher or of an experienced foreman.

"(d) Unless otherwise expressly approved demolition should be executed storey by storey commencing at the roof and working downward.

"(e) All practicable precautions should be taken to avoid danger from collapse of a building when any part of a framed or partly framed building is removed.

"(f) Demolished material should not be allowed to remain on any floor or structure if the weight of the material exceeds the safe carrying capacity of the floor structure and such material should be so piled or stacked that it will not endanger workmen or other persons, and should be removed as soon as practicable from the site unless authorised by the building surveyor.

"(g) Dust creating material, unless thoroughly dampened should not be thrown or dropped from the building but should be lowered by hoisting apparatus or removed by material chutes.

"(h) Chutes should be complete enclosed and a danger sign should be placed at the discharge end of every chute.

"(i) N part of any external wall on or within 3 m of a street alignment should be pulled sown except during such hours as the building surveyor may direct.

"(j) No wall, chimney or other structure or part of a structure should be left unattended or unsupported in such a condition that it any collapse due to wind or vibration or otherwise become dangerous.

"(k) Protective outriggers should be installed where necessary to guard against danger to life or property or when required by the building surveyor."

Historic and Special Buildings

"56.5 Where it is proposed to alter any existing buildings which -

"(a) is on the register of historic buildings under the Historic Buildings Act 1981; or

"(b) in the opinion of the council is of special interest by nature of is design, appearance, location, use or environment -

the council may permit such alterations in similar style to the existing building if they comply with Parts 16-27, 44 and 47 and will not make the building structurally unsound."

Form 6
Building Control Act 1981
VICTORIA BUILDING REGULATIONS 1983

Regulation 12.1(3)

NOTICE OF INTENTION FROM OWNER OF LAND WHO IS REQUIRED TO PROVIDE PROTECTION FOR AN ADJOINING PROPERTY

(This notice must be served on the owner of the adjoining property and the building surveyor)

TO: Adjoining owner/building surveyor*

1. Pursuant to section 147(1) of the Building Control Act 1981 1 give notice of my intention to carry out building work on my land and request your agreement to the proposed protection works.

2. Owner of Property

Location of proposed building work:

Address: _____

Title particulars: _____

Municipality: _____

Owner's name: _____

Address for correspondence: _____

Contact person: Phone No: _____

3. Adjoining Owner's property

Location of property required to be protected:

Address: _____

Title particulars: _____

Adjoining owner's name: _____

4. Details and Documents:

(a) Details of the proposed building works at the date of this notice are as follows:

(b) Details of the proposed protection works setting out the nature. location time and duration of the protection works are as follows:

5. Signed Owner

Dated:

6. *Notes:*

(i) *An adjoining owner should be deemed to have agreed to the proposed protection works if he/she has not responded with Form 11 within 14 days.*

(ii) *An adjoining owner may disagree with the proposed protection works or request further information by responding with Form 11 within 14 days.*

(iii) *Agreement to these protection works does not prejudice an adjoining owner's rights under sections 149 to 159 of the Building Control Act 1981."*

Form 11
Building Control Act 1981VICTORIA BUILDING REGULATIONS 1983
Regulation 12.1 (4)

NOTICE OF AGREEMENT, DISAGREEMENT OR REQUEST FOR FURTHER INFORMATION ON PROTECTION WORK FROM AN ADJOINING OWNER.

TO: Owner/building surveyor*

1. Pursuant to section 147(2) of the Building Control Act 1981 I hereby respond to the Form 6 notice served on me on (date).

2. Owner's Property

Location of proposed building work:

Address: _____

Title particulars: _____

Municipality: _____

Owner's name: _____

Address for correspondence: _____

Contact person:Phone No.:_____

3. Adjoining Owner's property

Location of property required to be provided with protection.

Address: _____

Title particulars: _____

Adjoining owner's name: _____

Address for correspondence: _____

Contact person: Phone No.: _____

4. I hereby

A. Agree to the proposed protection works*.

or

B. Disagree with the proposed protection works for the following reasons*.

C. Request the following further information*.

Signed:

Dated:

* (Strike out whichever is inapplicable)

5. *Notes*

(i) *Where the adjoining owner has agreed to the protection works he/she may serve this notice on the owner within 14 days.*

(ii) *Where the adjoining owner has not agreed to the protection works, or has requested further information this notice must be served on the owner and building surveyor within 14 days and the building surveyor should determine the matter.*

(iii) *An adjoining owner should be deemed to have agreed to the proposed protection works if he/she has not responded with this form within 14 days.*

Form 5
Building Control Act 1981
VICTORIA BUILDING REGULATIONS 1983

Regulations 8.2 (1), 8.4 (1) and 8.6 (1)

APPLICATION FOR BUILDING APPROVAL

To the Development Approvals Coordinator _____Municipality

*City _____

Town _____

Borough _____

Shire _____

I,# _____ hereby apply for an approval to remove
*to construct, to demolish, for a stage of building work on

*Allotment _____

A building on Street No. in Street _____

Nature of Construction-*new building, alteration, addition, repair.

Owner of Land{ Name _____

{ Address _____

Superintending Architect and/or Engineer

{ Name _____
{ Address _____

Builder{ (Name _____
{ (Address _____

Purpose for which building is to be used

If purpose is for a Dwelling-house-

Attached herewith is Certificate of Guarantee Status of Domestic Building Work S R- issued by the Housing Guarantee Fund Limited under the House Contracts Guarantee Regulations 1988.

Estimated cost of building work

I hereby undertake that the *construction, demolition or removal will be carried out in conformity with the requirements of the Victoria Building Regulations 1983 and of the by-laws of the municipality.

Date _____ day _____ of 19____

Signature _____

*Owner _____

Agent of Owner _____

Fee _____

Building Approval{ Number _____

{ Date granted. _____

*** Strike out words which are inapplicable.**
 # Insert name of applicant

NOTE: *Pursuant to section 20 (22) of the Building Control Act 1981 a person should not act as the agent of an owner unless he is authorised in writing by the owner to do so.*

Appendix 3 Checklists

A . Building Owner Checklist

[ ] Have all the available plans and specifications of the building been provided to the demolition contractor?
[ ] Have the necessary approvals been obtained from the regulator authority?
[ ] Have the relevant authorities controlling essential utility services been notified?
[ ] Has the extent of the demolition work been defined?
[ ] Has a realistic period of time been allocated for the demolition?
[ ] Have the adjoining owners been notified and protection works agreed to?
[ ] Has the extent, nature and location of hazardous materials been documented?
[ ] Have all services been located?
[ ] Have all underground tanks, vaults and wells been located?
[ ] Have all chemicals, volatile fuels and gases been deactivated?
[ ] Is the building free from vermin?
[ ] Is the vacant building secure from fire?

B. Safety Checklist

[ ] Workplan prepared and available on site?
[ ] Safety plan prepared and available on site?
[ ] Telephone with all emergency number displayed?
[ ] First aid person and kit on site?
[ ] Overhead protection, hoarding, gantries and protective structures sufficient to protect public and prevent unauthorised entry?
[ ] Fire fighting equipment available and persons trained in its use?
[ ] Demolition warning signs in place?
[ ] Safe access to site office clearly marked?
[ ] Toilets, and amenities clean and in a safe area?
[ ] safe access to work areas clear or rue)le and well lit?
[ ] Competent supervision on site?
[ ] Asbestos and other hazardous substances been removed?
[ ] Tanks, voids and vaults located?
[ ] Tanks degassed and rendered safe?
[ ] Electricity, gas and other services not required cut off?
[ ] Earth leakage to all temporary power?
[ ] Shoring and underpinning where required?
[ ] Floors back propped where required?
[ ] Penetrations in floors covered or barricaded?
[ ] Open sides of floors, roofs, stairwells, lightwells and lift shafts protected?
[ ] Vehicle buffers provided at debris chutes and openings?
[ ] Debris dropping zone clearly signed and barricaded?
[ ] Welding and cutting cylinders in cages or otherwise secured?
[ ] Fire extinguishers with cutting gear?
[ ] Goggles, gloves and protective equipment provided with cutting gear?
[ ] Jack hammers and compressors fitted with silencers?
[ ] Compressor hose connections fitted with safety pins?
[ ] Respiratory, hearing and eye protection provided?
[ ] Debris cleared from floors to prevent overloading?
[ ] Combustible debris not building up to become a fire hazard?
[ ] Lift shafts barricaded and catch platforms where necessary?
[ ] Safe work platforms provided?
[ ] Hard level surface provided for elevated work platforms, free from penetrations or upstands?
[ ] Scaffolds tied to structure, safe working decks guardrails, toe boards and access provided?
[ ] Scaffold undamaged and free from debris?
[ ] Where site adjoins public place perimeter scaffold provided and dust proofed?

- **[ ]** Earthmoving equipment and demolition machinery operated by competent persons with the appropriate certificates of competency where required?
- **[ ]** Earthmoving equipment and demolition machinery provided with overhead protection where appropriate?
- **[ ]** Earthmoving equipment and machinery used on floors certified safe by an engineer and backpropped where required by engineer?
- **[ ]** Engineers report on floors to support earthmoving equipment and demolition machinery made known to the relevant persons on site?
- **[ ]** Health and Safety representatives consulted and informed of all workplans, safety plans and intended work procedures on site?

Appendix 4: Some General Terms used in the Demolition Industry

Battens:	Timber members of sectional dimensions
Ceiling:	Light members, nailed to ceiling joists, to which the ceiling is fixed
Roof or Tile Roofing:	Timbers fixed to the tops of rafters to which the roof coverings may be secured
Beam:	A horizontal load-bearing structural member
Cantilever:	A projecting beam with one end unsupported
Bearer:	A sub-floor timber supporting the floor joists
Bearing:	That part of any member of a building that rests upon its supports
Brace:	A member, usually a diagonal, which resists lateral loads and/or movements of a structure
Brace Frame:	A building framework in which the comer posts are braced to sills and plates
Brick Construction	A construction where the external and internal walls are built of brick
Brick Corbelling:	A brick, load bearing projection from a wall either isolated or continuous.
Brick Pier:	A detached mass which serves as a support
Brick Veneer Construction:	A method of construction in which wall framing of timber or metal is enclosed externally by a veneer of brickwork
Building Line:	The line or limit, on a lot beyond which the law forbids the erection of a building
Bulkhead:	A box like structure which projects above or below a roof, floor or ceiling.
Ceiling:	The overhead internal lining of a room.
Acoustic:	Ceiling materials to absorb or reflect sound or prevent sound transference to adjacent areas.
Suspended Or False:	A ceiling which is suspended from and is not in direct contact with the floor or roof construction above and generally used to conceal services.
Ceiling Joists:	The joists, usually acting as a tensile roof member and which support the overhead interior lining of a room or serving as floor joists for a storey above.
Chase:	A rough groove or recess cut into a masonry wall for water pipes, conduits, etc
Chute:	An inclined or vertical trough or tube through which articles are passed from a higher to a lower level.
Cleat:	A small piece of timber fixed to a larger piece, as a bearing block.
Clout:	A nail, usually galvanised, with a flat circular head
Column Footings:	Concrete footings, reinforced with steel rods, used as supports for columns.
Coping:	The capping or covering at the top of a wall
Corbel:	A projection from a wall, either isolated or continuous, usually load bearing
Cornice:	a) horizontal projection at the top of a wall b) a mould placed at the junction of wall and ceiling
Crazing:	Fine cracks that may occur on plastered or rendered surfaces
Dado:	The lower portion of a wall above the skirting when finished in contrast to the remainder of the wall.
Datum:	A predetermined level on a site from which all other levels are established
Dead Load:	A permanent inert load on a building or other structure due to the weight of its structural members and the fixed loads they carry, which impose definite stresses and strains upon the structure
Decibel:	A unit for measuring sound intensity
Distributed Load:	A load spread over a surface expressed in kilograms per square metre, or along a length c member exposed in kilograms per metre
Division Wall:	Wall which separates buildings or which divides space within a building into several rooms c compartments.
Door Frame:	A frame into which a door is fitted.
Doorhead:	The upper part of the frame of a door.
Door Jambs:	Two vertical members of a door frame
Dowel:	A wood or metal pin used to strengthen a joint by its insertion partly into each of the joined pieces
Eaves:	The lower part of a roof that overhangs the walls

Egress: Way out

Elevation:	A geometrical drawing of a facade of a building
Engineer:	A professionally qualified person, who when associated with building and planning, designs, supervises and manages civil, structural and services components of the project.
Facade:	The face or front wall of a building
Facia:	A board fixed horizontally to the lower ends of the rafters, to which spouting may be fixed. Also forms the outside board of a boxed eave
Fibro-cement or asbestos cement:	A building sheet composed of asbestos fibres and asbestos
finishes:	The final applied coat or natural surface of a material used in walls, ceilings or floors of a building
Fire escape:	A fire rated stairway to provide a means of escape, in case of fire, for persons within the building
Fire hydrant:	An outlet from a water main to which a fireman can connect his hose and control the flow as he wishes
First Floor:	The floor which is next above the floor at ground level
Floor (Finished Floor):	Floor covering, usually of high grade material laid over the subfloor or structural floor
Floor Framing:	The framework for a floor, consisting of bearers and joists
Footing:	The construction whereby the weight of the structure is transferred from the base structure to the foundation
Foundation:	The ground upon which the footings of a building are constructed
Frog:	The indent on one of the larger faces of a brick which forms a key for mortar
Gable:	The triangular end of a house formed at the end of a pitched roof, from eaves level to apex
Gantry:	A structure for the manipulation and transmission of heavy weights which normally runs parallel to the ground
Girder:	A main beam resting upon a wall or pier at each end and employed for supporting a superstructure
Gutter:	A gutter section with the lower outside edge in the form of a quadrant
Valley	Inclined gutter formed between intersecting sloping surfaces of a roof
Roof or Eaves Spouting:	The channel for collecting rain water from a roof
Handrail:	A railing which serves as a guard and which is intended to be grasped by hand to serve as a support
Hanging Beam (Hanger):	A beam above the ceiling joists, supported on walls or partitions to which the ceiling joists are fixed by "dogs," cleats or straps (eg hoop iron or small timbers) in order to prevent any deflection
Hardboard:	A hard wallboard of highly compressed wood fibre
Hatching:	Parallel lines drawn close together for the purpose of shading or to indicate a material shown on a drawing
Hearth:	The floor of a fireplace, including a small area in front of the fireplace paved with incombustible materials
Iron - Black:	Ungalvanised steel eg piping
- Galvanised	Rolled sheet or strip iron, zinc coated in flat and corrugated sheets of various gauges
Joists ceiling:	Timber members spanning between walls or other supports to which the ceiling batterns or ceiling is attached
King Post:	Vertical timber tie used to connect the ridge and the tie beam of a roof, shaped at its lower end so as to afford bearing to two struts which support the middle points of the rafter
Lagging:	Insulated covering for services (eg hot water pipes)
Lap - End:	In roofing, the amount by which the upper sheet or unit roofing overlaps the sheet or unit immediately below it
Lap - Side:	In roofing, the amount by which the upper sheet or unit of roofing materials overlap each other at the side joints
Lateral Thrust:	The pressure of a load which extends to the sides
Lean-to:	A small building or extension of a building having a single-sloped roof whose rafters pitch or lean against another building or support
Lintel:	A beam spanning an opening

Live Load:	The load arising from the intended use or purpose of the building or structure, but excluding wind, snow and earthquake loads
Load Bearing Wall or Partition:	a) a wall which supports the floors and roof in a building b) a partition that carries the floor joists and other partitions above it
Main:	Street reticulation service provided by the supply authority, eg gas, water and sewerage
Mantle:	A shelf over a fireplace
Masonry:	Brick, concrete, stone, artificial stone or terra cotta laid in mortar
Matrix:	The mixture of sand and cement that binds together the aggregate of concrete
Metal ties:	A type of steel tie used to bond two separate wall sections together in cavity type walls
Meter:	In the commercial distribution of electricity, water and gas, an instrument for measuring the quantity of service supplied to a consumer
Mortar:	A composition of lime and/or cement and sand mixed with water in various proportions
Mortar Joints:	Types of joints in finishing the mortar in stone or brick work
Mosaic:	Combination of small coloured stones, glass or other material to form a decorative surface design, inlaid usually in a ground of cement or stucco
Moulding:	When any work is wrought into long regular channels or projections forming curves, rounds, hollows, it is said to be moulded and each member is a moulding
Mullion:	A vertical member dividing a window frame
Nail Spring-Head:	A galvanised nail with a mushroom-shaped head used to fix corrugated iron sheets
Natural Foundation	A foundation in soil which requires no preparation (eg the driving of piles to make an effective foundation for supporting the structure)
Needle:	A short stout timber, steel or iron beam which is passed through a wall horizontally to support the end of a shoring timber
Niche:	A recess or hollow sunk in a wall
Nogging:	A horizontal piece of timber fixed between studs in a framed wall
Over-loading:	Placing too heavy a load on a beam, column or floor
P.V.C.:	A widely used plastic – main uses include water pipes, (Polyvinyl Chloride) waste pipes and flooring
Pad Stone:	A bearing stone in a wall under a girder or other beam or as a lintel to distribute the weight or pressure of the load above
Pane:	Single piece of glass in a window or door
Parapet:	Low wall at the edge of a roof, balcony, bridge or terrace
Partition Wall:	An interior non-bearing wall dividing a building into rooms
Party Wall:	The wall between two adjoining buildings but common to and used to the advantage of both buildings
Pergola:	An open framework over a path, terrace or patio
Picture Rail:	Moulding or rail, around the interior walls of a room near the ceiling, provided for hanging pictures
Pier:	A column or post supporting a superstructure such as floor bearers, verandas, beams etc
- Engaged Pier:	A pier bonded into a wall
- Sleeper Pier:	Independent brick, concrete or wooden supports for floor bearers
Pillar:	An upright shaft or column, relatively slender in comparison to its height
Pile Driving Machinery:	A mechanised device which raises and drops a heavy metal "hammer" onto piles from a height sufficient to drive the piles into the earth. The motive power is obtained from oil or steam engines
Planning:	A process by which a forward programme of events is formulated
Plaster:	Material of mortarlike consistency used for covering walls and ceilings of buildings usually made of Portland cement mixed with sand and water
Plasterboard:	A rigid insulating board made of plastering materials covered on both sides with heavy paper
Plumb:	Vertical or perpendicular
Point of Entry:	The point at which the service line or the consumer's mains enter a building
Polystyrene Foam, Polyurethane Foam:	Plastic materials in foam form used for thermal insulation

Polythene (Polyethylene):	Widely used flexible plastic, its main use being as a moisture barrier under floors
Porch:	A covered entrance to a building
Portal:	An entranceway (eg Door or gate)
Portico:	An open space covered with a roof supported by columns
Post:	A vertical structural member
Power Socket:	An electric outlet at the terminal of a power circuit
Pre-cast:	Poured or cast in any place other than its ultimate position (eg pre-cast units of concrete houses)
Prefabricated Construction:	The manufacture in a factory of whole or parts of buildings such as individual rooms, walls and roofs, in contract with the convential construction of a building piece by price on the site
Pre-Mix:	To mix materials together eg concrete or mortar before being transported to the building site. The process is usually carried out in large central depot.
Projection:	A jutting out of any part or member of a building
Purlins or Underpurlins:	a) in simple roof construction, longitudinal roof timbers giving intermediate support for rafters, supported at intervals longitudinally by struts b) in some roofs of trussed construction the purlins perform a different function, being the direct support for the roof covering, they bear on the principal rafters of each truss and span between trusses c) in roofs of trussed construction employing common rafters, purlins span between trusses supporting the lighter common rafters at requisite intervals
Pylon:	A gateway, a marking post, tower or another marker
Quion:	The dressed corner stone in a random masonry wall
Rafter (Common):	In roof construction, a timber framing member providing the principal support for the roofing material
Rail:	A piece of timber or metal extending from one post to another, as in fences, balustrades, staircases, etc; in joinery framing and panelling, the horizontal members are called rails, eg in doors, top rail, lock rail, bottom rail
Ram:	To compact or consolidate eg the consolidation of earth around fence posts, footings
Reinforced:	To strengthen by the addition of new or extra material (eg reinforced concrete - steel rods are embedded to give additional strength)
Reinforced Concrete Construction:	Building construction in which principal structural members are made of concrete which is poured around isolated steel bars or steel meshwork, in such a way that the two materials act together
Reinforcing Fabric:	Prefabricated steel reinforcement for concrete, consisting of an oblong or square mesh of parallel steel wires welded at points of contact and manufactured in flat sheets or rolls
Reinforcing Steel:	Steel bars of various sizes and shapes used in concrete construction for giving added strength
Rendering Cement:	The covering of a wall surface with one or more coats of cement mortar
Retaining Wall:	Any wall subjected to lateral pressure other than wind pressure and built to retain materials
Reveal:	The thickness of a wall from the wall face to the door or window frame. The remainder of the thickness of the wall is known as the 'jamb'
Ridge:	The highest part of the roof of a building at the meeting of the upper end of the rafters
Roofing:	The material put on a roof to make it watertight
Roof Truss:	A truss providing structural support for a roof
Rot - Dry:	A fungus disease in timber mainly caused by poor ventilation in which the fibres of the timber are reduced to a dry powdery dust
Rot - Wet:	A fungus disease in timber caused by excessive and continuous dampness, that results in the decomposition of the timber fibres
Roughcast:	External finish to a wall surface obtained by mixing bluestone toppings or pebbles, sand and cement to a creamy consistency and casting or throwing the aggregation onto the surface
Rubble:	Rough broken stones or brick used to fill in courses of walls or for other filling

Rubble Masonry:	Masonry built of rough fragments of broken, unsquared or rudely dressed stones, irregular in size and shape. When only the roughest irregularities are removed, it is sometimes called scabbled rubble, and when the stones in each course are roughly dressed to almost a uniform height, it is often called ranged rubble
S.A.A. Code or Specification:	A code or specification recommended by the Standards Association of Australia
Safe Carrying Capacity:	Design of any piece or part of a building to support the load without falling
Sagging:	The bending of a structure or structural member because of its own weight or from the load upon it.
Sarking:	A covering of waterproof building paper beneath the external roof covering
Sash Balance:	A mechanical suspension deigned to balance the weight of a vertically sliding window sash
Scabble:	the dressing down of the roughest irregularities and projections of stonework or the roughening of a smooth finish (eg concrete)
Scaffold:	A temporary support structure for workmen and materials, when the work is too high to be reached from a permanent platform
Scantings:	Sawn framing timbers of comparatively small dimensions (eg 100 X 50) in a building
Scarfing:	The joining of two pieces of timber together in length by which the two ends are cut to lap over and fit each other
Score (Scoring):	Marking with lines, scratches and grooves across a material with an instrument, for the purpose of roughening the surface
Secret Nailing:	Driving nails in such a way that the holes are concealed (eg through the tongue in T & G boarding)
Services:	Supply or distribution pipes for cold or hot water, steam or gas; also power cables, telephone cables, lift machinery, transformers, drains, ventilation ducts etc
Sheathing:	Outer casing or sheeting of a building
Sheeting:	Flat sheets of material to protect or cover a building framework
Shingles:	Thin pieces of wood or other material, oblong in shape and thinner at one end, used for covering roofs or walls
Shoring:	a) timbers used to prevent the sliding of earth adjoining an excavation b) the temporary or permanent support of existing structures, especially where they may be weakened by the removal of adjoining buildings
Site:	Ground on which a building stands, stood or is to stand in relation to its environment
Skirting:	Trim fixed on a wall at its junction with the floor
Skylight:	A window let into a roof generally with the same slope as the roof
Slab:	Flat thin piece of any material, such as stone, marble or concrete
Slab Floor:	a) a reinforced concrete floor b) a floor covered with slabs of terrazzo, marble, slate, limestone, granite, cast stone
Slack:	A looseness in a fitting or a structural member which must be removed to ensure proper construction
Slates:	Roofing material made from slate which has a laminated structure capable of being split into thin pieces
Soffit:	The lower face or under-surface of anything (eg the under-face or an arch, the underside of the eaves of a roof)
Spall:	a) a fragment or chip of masonry b) to reduce an irregular stone block to approximately the desired size by chipping with a hammer
Specification:	A written document containing details of work to be done and materials to be used in the construction of a building
Stability:	The resistance of a structure to sliding, overturning or collapsing
Staging	The same as scaffolding
Storey:	That portion of a building situated between any floor level and the floor level next above it if there is no floor level above , that portion between the floor level and the ceiling above it.

Storeys:	The number of storeys in a building is the number of main floors above ground level, including the ground floor but excluding penthouses, or machine or plant room above the main roof level. Basements below ground level should be stated separately (eg 2B + 12 Storeys)
Structure:	a) the loadbearing part of a building b) anything built by man from an earth wall to a power station. A structure is not necessarily roofed, a building is
Strut:	An inclined structural member in compression
Stucco:	A process of cement rendering external walls
Stud Partition:	A partition built of studs
Sub-Station:	A room or building containing electrical equipment such as switches, usually with transformers to reduce high - voltage incoming power to a voltage at which the consumer can conveniently use it. It may be provided by the electricity authority or the consumer
Substructure:	The lower portion of a Structure forming the supports for the superstructure of a building
Sullage:	The waste liquids discharged from all plumbing fixtures, excluding water closets and urinals
Sump:	A pit generally constructed with the floor below the level of the outlet pipe and designed for the disposal of stormwater or sullage
Sump Pump:	A pump of small capacity for occasionally emptying a sump in a part of a building which is below the level of the drains
Surface:	Face of a material
Suspended Ceiling:	See CEILING, Suspended or False
Switchboard:	Electric switchgear with or without fuses or instruments which includes distribution boards, but does not include groups of switches in final sub-circuits, where each switch has its own insulating base and protective covering
Tension:	A pulling or stretching force
Terra Cotta:	Clay shaped into various building forms, eg roofing tiles, and baked at high temperatures in special kilns
Terazzo:	Material produced by setting irregular fragments of marble in a matrix of cement and rubbing them down to a smooth surface
Thrust:	The outward pressure on a material due to the load carried by it (eg by a rafter against a supporting wall)
Tie:	A horizontal member in tension, usually a timber or steel rod binding two members of sections of a building together to prevent spreading
Tie- Collar:	A timber member tying a pair of rafters, usually placed midway between the wall plate and ridge
Ties - Wall:	Shaped galvanised wire or galvanised iron straps built into cavity walls to bind the inner and outer leaves; also in brick veneer construction to bind the framework to the brickwork
Tile Wire:	In tile roofing, copper, galvanised or other wire, used to tie roofing tiles to the battens in the French (Marseilles) pattern tile. The wire is inserted through a special lug on the underside
Tile - Apex:	A special angular ridge tile used to cover the intersection of a ridge and hips
Tile - Concrete:	Roofing tiles made of concrete in various shapes and sizes
Tile - Floor & Walls:	Usually thin slabs of specially prepared clay in a variety of sizes, colours and patterns, baked at high temperatures. Glazed tiles are generally used for walls and unglazed tiles for floors
Tile - Terra Cotta:	A terra cotta roofing component; the shape most commonly used has been the French pattern, commonly known as "Marseilles" tiles
Tom:	A temporary prop or strut
Tonguing & Grooving:	A method by which one board is grooved along the edge and the other tongued so that one fit into the other
Trap:	A plumbing term used to describe any fitting which retains water to form a water seal for preventing the passage of gases, or for intercepting gases or silt, grease, acid or oil and

	that permits the free passage of liquids and solids though it. The depth of water in a trap through which gas must pass to effect passage is called the 'water seal'
Trap Boundary or Interceptor:	A trap generally placed as near as possible to the point or where the sewer leaves a property for discharge to the main sewer or where the house sewer line discharges into the main sewer; a trap preventing the passage of air or gases from the sewer to the drain at some point between the sewer and the lowest inlet to the drain.
Trap:	A trap for isolating or disconnecting waste pipes from
Disconnector or Gully:	The drain and soil pipes and providing inlet ventilation to the waste pipe or pipes discharging into it
Trap Grease:	A trap designed to prevent grease entering the drainage system.
Trap Door:	A covering for an opening in a floor, ceiling or roof
Tread:	In a stairway, the horizontal portion of each step
Trellis:	A structure or frame of cross-barred or lattice work
Trench:	a) in joinery, a groove b) in drainage and plumbing, the excavation in which pipes are laid c) in foundations, the excavation in which footings are placed
Tuck pointing:	The finishing of masonry joints along the centre lines with a narrow parallel ridge of fine lime mortar
Underpinning:	The construction of new footings and walling under the footings of an existing structure which have failed or may fail
Utility Services:	All reticulation services such as water supply, gas supply, sewerage, electricity and garbage disposal
Valley:	The internal angle formed by two inclined slopes of a roof
Vault:	a) an arched structure of masonry usually forming a ceiling or roof b) specially constructed space for security of documents
Veneer:	Thin slices of a material used as a facing on other elements of a structure. Timber veneer is commonly used as a facing. This veneer is produced by rotary cutting or slicing logs or billets
Ventilation:	The process of changing or circulating the air in a space by either natural or artificial means
Wall:	An upright structure of definite dimensions for enclosing space, constructed of stone , brick or other suitable building material
Wall - Bearing:	A wall that supports a vertical load additional to its own weight
Wall - Cavity:	A wall built in two sections (leaves) with a space between, generally tied together
Wall Anchor:	A type of anchor used to tie the walls to the floors and hold them firmly in position
Wall Bracket:	Any bracket attached to a wall to support a structural member
Wall Face:	The finished surface of the wall
Warped:	Twisted out of shape (eg Timber)
Wash Basin:	A basin or bowl for holding water in which to wash one's hands and face
Waste:	A fitting connecting an internal plumbing fitting to the external drains
Water Closet:	A room equipped with a toilet fixtures and facilities
Water Heater:	Equipment designed to heat water
Waterproof:	Materials and a construction which will prevent water from passing through walls and joints
Water Service:	Pipe reticulation for the purpose of supplying water from the water main to various fittings, eg bath, basin, sink
Watertight:	Construction which is waterproof
Watt:	A unit of electric power
Weatherboarding:	External wall sheeting formed with horizontal over-lapping or rebated boards
Weathering:	The sloping surface (eg. of a sill or coping) designed to permit rapid shedding of water
Weathertight:	A joint which does not permit the passing through of wind, water, heat or cold
Wedges - Foldings: (Fox Wedges)	Timber wedges used in pairs for lifting and tightening. In Australia, commonly called 'fox wedges'
Weep Holes:	Openings sometimes left in perpends of a brickwork course over flashings, and at the

	bottom of wall cavities for drainage purposes
Welding:	Joining of two pieces of metal together when raised to a great heat
Wind Brace:	A structural member, either a tie or strut used to resist lateral wind loads
Wind Load:	The estimated pressure or force exerted upon a structure by the wind, which must be provided for, in the design of the structure
Wind Proof:	Construction which prevents the passage of wind through joints or materials
Window:	An opening in an outside wall (other than a door) to provide natural light and/or ventilation and covered by transparent material inserted in a frame either openable or fixed
Wiring:	In electrical work, placing and connecting the various conductors or lighting and power circuits
Wood Flooring:	Standard dressed and matched flooring
Wood Frame Construction:	Construction in which the structural members are of wood or dependent upon a wood frame for support
Wood Mouldings:	Timber trim members consisting of mouldings
Wood Turning:	The process of shaping pieces of wood into various forms by a lathe
Woodwork:	Work done in, or parts made of, wood
Work Face:	In squaring up a material, the first surface to be finished is called the work face. The specific area of the site where demolition activity is taking place.
Working Drawings:	Drawings which are produced by the architect and his consultants for the purpose of constructing a building
Wrought Iron:	A commercial form of iron which is malleable, tough and relatively soft