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# Standard S151 Prevention of Falls

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[Annex A](#) [Risk Profile – Working at Heights](#)

[Appendix 4](#) [Fall Injury Prevention Systems \(FIPS\)](#)

[Annex A](#) [Guide to Types of FIPS for Use in the Water Corporation](#)

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[Appendix 6](#) [Rescue Planning for Working at Heights](#)

## 1 Purpose

The purpose of Standard S151 Prevention of Falls (the Standard) is to provide guidance to designers and operators in order to minimise and prevent injuries to personnel working at heights on Water Corporation infrastructure and in the workplace in general. Any job that requires personnel to work at heights and/or there is a risk of falling, requires that the hazards are identified, assessed and control measures identified, and agreed by the personnel involved.

By way of this Standard the Water Corporation complies with the *Western Australian Occupational Safety and Health Act 1984*, the *Occupational Safety and Health Regulations 1996*, the *Australian Standard 1657 Fixed platforms, walkways, stairways and ladders – Design, construction and installation*, and the *Work Safe Code of Practice, Prevention of Falls at Workplaces*.

This Standard adopts the *Code on the Prevention of Falls at Workplaces and AS 1657 on Fixed platforms, walkways, stairways and ladders – Design, construction and installation* and is modified to meet the specific business needs of the Water Corporation. At no time will the Water Corporation implement a standard that is less than that prescribed in the *Code on the Prevention of Falls and AS 1657 Fixed platforms, walkways, stairways and ladders – Design, construction and installation*.

Where this Standard exceeds the control measures set out in the *Code of Practice on the Prevention of Falls and AS 1657 on Fixed platforms, walkways, stairways and ladders – Design, construction and installation*, this Standard shall take precedence.

### Western Australia Work at Heights Statistics

- On average there are two deaths per year due to falling from a height.
- On average 6% of all LTI/Ds involve falls from heights, about 1200 LTI/Ds each year.
- On average, each injury involving a fall from a height results in about 100 days off work.
- The most common types of injury resulting from work at heights are sprains and strains, fractures and bruising.
- Typical accidents in this category are workers falling from ladders, stairs or steps in a variety of occupations.

### National Workers' Compensation Statistics

Injury or death can occur as a result of a fall from any height.

The National Occupational Health and Safety Commission (NOHSC) identified a number of high risk industries and mechanisms of injury/disease to initially target for prevention activity. One of the mechanisms identified was falls, trips and slips of a person.

Falls, trips and slips of a person accounted for nearly 19% of total claims in 2000-01. This percentage has remained constant over 5 years despite a decrease in the number of claims.

The preliminary data for the year 2000-01 shows that there were almost 27,000 compensated claims as a result of workplace-related injuries or diseases inflicted by falls, trips and slips of a person. The majority of these were caused by falls on the same level (approximately 60%). **Claims due to falls from a height constituted 34% of the falls, trips and slips claims.** The most common body areas affected were in the lower limbs.

**All compensated fatalities as a result of falls, trips and slips of a person were males, and almost all were in the 55+ age group. The majority (15) resulted from falls from a height, with most (35%) due to head injuries sustained from the fall.**

## 2 Scope

This Standard applies to all Water Corporation workplaces. It provides detailed guidance on the prevention of falls and necessary control measures at Water Corporation workplaces.

It is acknowledged that this Standard will not cover all prevention of falls and working at heights situations in the Water Corporation directly. However the principles of this Standard should be adhered to by planners, designers, supervisory staff and operators. The principles are:

- **Elimination** e.g. Design the work to completely eliminate work at heights.
- **Substitution** e.g. Provide a stable work surface instead of an unstable or fragile one.
- **Isolation** e.g. Provide physical barriers to separate or isolate the workers from the place they may fall from or through.
- **Engineering** e.g. Use Fall Injury Prevention Systems (FIPS) to restrain or arrest a person's fall from one level to another.
- **Administration** e.g. Provide training in safe work practices, requirement to use PPE.

For all Water Corporation workplaces, the desired FIPS when working at height is fall restraint rather than fall arrest. The exception is the use of a fall arrest system on fixed ladders e.g. Beaver/Fallright/Dyna-glide.

**Fall Restraint** is suitable for use where the user can maintain secure footing without having to tension the line and without the aid of a hand hold or support. Slope, surface and material type should be considered e.g. a static line used on solid ground near an edge. Fall restraint comprises an anchor point, restraint line, energy absorber and fall arrest harness.

**Fall Arrest** is suitable instead of restraint if the user can reach a position where a fall may be possible or a danger exists where the user could fall through the surface e.g. ladder climbing system or working on fragile roofing. Fall arrest comprises an anchor point, lanyard with energy absorber and fall arrest harness.

All staff required to work at heights are to be trained in working at heights and in the use of relevant equipment. This Standard seeks to provide guidance for the training of Water Corporation personnel required to:

- Supervise personnel who work at heights
- Work at heights themselves
- Plan and design Water Corporation infrastructure
- Inspect FIPS
- Plan rescues

### **3 Definitions, References and Standard Drawings**

Definitions used in this Standard, relevant references and standard drawings are at Appendix 1.

Most drawings listed in Appendix 1 apply to sections of this Standard.

### **4 Prevention of Falls Criteria**

A summary of the key criteria for the prevention of falls established in this Standard is at Appendix 2. This summary should not be referred to in isolation. Details are in the main body of this Standard.

Schematics of the key criteria are at Annex A to Appendix 2.

### **5 Who to Contact for Advice**

Manager Strategic Asset Management is the custodian of Standard S151 Prevention of Falls. Any questions relating to the standard should be directed to the Regional or Branch OSH Co-ordinator.

## 6 Standard Amendments

All requests for amendments to Standard S151 Prevention of Falls must be lodged using the [Assets and Operations Improvement \(AOI\) Process](#). The AOI Process is used to assess opportunities for improvement in the configuration, design, construction, operation and maintenance of infrastructure assets. This process has been used to successfully identify and assess proposed changes to S151 Prevention of Falls.

The [AOI page](#) provides more information on the AOI Process. If you have any queries regarding the AOI Process, or want to request a change to S151, please contact the Engineering Standards Coordinator in Strategic Asset Management Branch.

## 7 Legal Responsibility

The “*Occupational Safety and Health Act, 1984*” and the “*Occupiers Liability Act 1985*” both place certain responsibilities on the owner/occupier or principal employer/person in control of a workplace. In order to discharge duty of care, the Water Corporation shall ensure there is an assessment of each workplace for potential hazards, and perform a risk assessment to determine those measures to reduce the risk of injury or harm to their staff/contractors, contractors and that of the public.

The *Occupational Safety and Health Act, 1984* requires the employer or principal employer to ensure that employees are not exposed to hazards so far as practicable. In addition, there is a duty of care responsibility to those persons who are not employees, but are at the workplace, and the interpretation is similar to that explained as per the *Occupier’s Liability Act 1985*.

“Practicable” takes into consideration:

- The likelihood of injury occurring
- The probable nature of the injury or harm
- The means of reducing the risk
- The availability and suitability of those measures in reducing the risk
- The cost in reducing the risk

Specifically, in the “*Occupiers Liability Act 1985*”, the following takes into consideration in the occupier discharging their duty of care responsibility:

- The gravity and likelihood of the probable injury
- The circumstances of the entry onto the premises
- The nature of the premises
- The ability of the person entering the premises to appreciate the danger
- The burden on the occupier of eliminating the danger or protecting the person entering the premises from the danger as compared to the risk of the danger to the person.

In itself, the employer, principal employer or occupier cannot foresee every risk at the workplace, however by adopting the process of identifying and assessing hazards, the means to controlling these risks becomes planned.

## 8 Site Security and Public Safety

Whilst the focus of this Standard is on prevention of falls in the workplace it is recognised that the Water Corporation has obligations under the Federal Government Owner and Operator of Critical Infrastructure Guidelines and under the *Occupiers Liability Act 1985* related to site security and public safety. Therefore, some aspects of this Standard embrace those obligations, e.g., stairway security barriers, ladder shrouding and signage.

Public Safety and Security measures shall be assessed for each particular site and shall take into account previous history of unauthorised access and likelihood of future unauthorised acts. For guidance, refer to *Site Security, Public Safety and OSH Signage Standard S197*, *Site Security and Public Safety SG081* and *Water Corporation Design Standard DS 62 Security Treatment Standard*.

## **9 Risk**

*A hazard identification, risk assessment and control shall be carried out on each job with a risk of a person falling, using the Water Corporation's hazard identification, assessment and control procedure, WC OSH07 Safe Job Planning.*

Appendix 3 deals with Working at Heights Risk Management.

## **10 Responsibilities**

### **10.1 General**

This Standard shall be used by any person who has a duty to prevent, as far as practicable, falls at Water Corporation workplaces. This includes line managers, staff, contractors, self-employed people, architects, engineers, designers, builders, manufacturers, suppliers and safety and health committees.

The practical guidance in this Standard shall be considered in conjunction with the general duties in the *Occupational Safety and Health Act 1984*. The general duties of the following personnel shall be considered in the prevention of falls in the Water Corporation.

The following responsibilities apply so far as is practicable.

### **10.2 Manager Strategic Asset Management**

- Appointed the Prevention of Falls Standard Document Custodian
- Manage and review the document in accordance with the requirements of the CorDocs system

### **10.3 Asset Owner (Principal)**

- Ensure assets are constructed to minimise the risk of falls from heights and to depths for all employees, contractors and the public
- Ensure that FIPS at a workplace are selected and installed so as to be capable of withstanding the force applied to it as a result of a person's fall at the workplace in accordance with forces prescribed in *ASNZS 1891.4 Industrial fall arrest systems and devices – Selection, use and maintenance*
- Ensure the safety and health of anyone they engage (called the contractor in the Act) to do the work. The Principal is considered to be the employer of a contractor and any people employed or engaged by the contractor to carry out the work. Thus the principal has an employer's 'duty of care' to contractors and their employees for matters over which the principal has control
- Custodian of Standard S151 Prevention of Falls

### **10.4 Line Manager**

- Provide a safe workplace and safe system of work so staff/contractors are not exposed to hazards
- Ensure staff are trained in working at heights and rescue planning as applicable:
  - Use of Fall Injury Prevention Systems
  - Prevention of Falls General Awareness
  - Inspection of FIPS
  - Rescue Planning
- Provide staff/alliance contractors with information, instruction, training and supervision to enable them to work in a safe manner
- Ensure information on height safety deficits of assets is formally communicated to the asset owner (asset manager)

- Ensure contractors incorporate the Standard S151 Prevention of Falls in their safety management system, ensure that height safety risks are identified and adequate controls, instruction, training and supervision are provided to enable their employees to work in a safe manner.
- Consult and co-operate with safety and health representatives (if any) and other staff/contractors in matters related to safety and health at work
- Provide adequate protective clothing and equipment where hazards cannot be eliminated
- Maintain records of inspections and testing of FIPS items, including anchor points by a competent person
- Ensure rescue plans are prepared and practices and exercises are conducted
- Ensure internal and/or external contracts are in place for the inspection and testing of FIPS items, including anchor points, by a competent person.

#### **10.5 Staff and Contractors**

- Shall take reasonable care to ensure their own safety and health at work, and the safety and health of others affected by their work
- Maintain currency in height safety competency relevant to their work tasks profile
- Identification and assessment of hazards in relation to falling
- Ensure that appropriate industrial fall-arrest systems and devices are selected for the task, used and properly maintained
- Ensure that harnesses, lanyard assemblies, connectors, fall-arrest devices, ropes, slings, mobile attachment devices are inspected by sight and touch. This includes the opening or removal of temporary rope or line protectors, to enable rope to be properly inspected. Operation of the locking mechanism on fall-arrest devices shall also be checked. Lives depend upon the continued efficiency and durability of the equipment.
- Ensure that defective FIPS are reported and either destroyed or if appropriate repaired and recertified.

#### **10.6 Manager Infrastructure Design**

- Ensure internal design staff are trained in Prevention of Falls Awareness for Designers
- Ensure design standards and standard designs incorporate the requirements of S151
- Where practicable relevant design contracts shall include the requirement for persons involved in the design of infrastructure to have attended Prevention of Falls Awareness for Designers
- Ensure design specifications include the need for the design, where practicable, to eliminate the need for working at heights

#### **10.7 Designers**

- Design should endeavour to eliminate the need to work at heights
- Ensure S151 is implemented in design of new assets and alterations to existing assets
- Ensure Industrial fall-arrest systems and devices are designed in accordance with *AS 1891 series 1-4 Industrial fall-arrest systems and devices*
- Ensure that Fixed platforms, walkways, stairways and ladders are designed in accordance with *AS 1657 Fixed platforms, walkways, stairways and ladders — Design, construction and installation* and this Standard
- Design of Water Corporation sites shall promote/support safe working/rescue from heights

**10.8 Manager Human Resources**

- Establish working at heights training competencies in consultation with Manager OSH
- Provision of a panel of suitably experienced, nationally registered training organisation trainers, to conduct working at heights training for:
  - Staff and alliance contractors
  - Supervisory staff
  - Designers
  - Rescue Planning
  - Inspection of FIPS
- Maintain records of currency of training of individuals
- Notify line managers of staff training course attendance
- Arrange training

**10.9 Manager Occupational Safety and Health**

- Provide advice on selection and use of FIPS
- Provision of a panel of FIPS suppliers with the contract to include training on equipment to be supplied

**10.10 OSH Coordinators**

- Assist line managers and staff/contractors in the identification and assessment of hazards in relation to falling
- Organise and assist with the inspection of FIPS and anchorages
- Ensure all records are kept in a designated location for inspections, testing and maintenance for FIPS

**11 Health Issues for Working at Height**

Certain health and medical conditions must be considered for employees working at heights.

A number of conditions may predispose to drowsiness, dizziness, loss of consciousness or impaired coordination which could, in turn, predispose to a fall.

These conditions include (but are not limited to):

- Cardiac arrhythmias (heart rhythm irregularities)
- Ischaemic heart disease e.g. angina
- Insulin dependent diabetes
- Fainting or blackouts
- Fits/epilepsy

Certain medications and alcohol/substance abuse

*The Fitness for Work WC-OSH 202* procedure provides guidance in relation to:

- Employee responsibilities
- Line manager/supervisor responsibilities
- General management guidelines which cover the identification of areas of concern, initial assessment, immediate action required, medical assessment (as appropriate) and the management of complex cases.

## 12 Design Requirements for Working at Heights

OSH in Design is one of the four strategic objectives included in the 5 year plan of the Commonwealth funded Australian Safety and Compensation Council.

During the planning stage, consideration should be given to the methods by which operations and maintenance will be undertaken on structures, buildings and mechanical and electrical/electronic equipment. Consideration of future operations and maintenance requirements at the early design stage may avoid the possibility of unsafe work practices.

Design of new infrastructure and upgrades should eliminate the need for inspection/operations/maintenance tasks to be performed at heights/depths

Where this is not possible, the priority of access shall be sloping walkway, stairway, steps, inclined ladder and vertical ladder. A work platform with edge protection covered in this Standard, shall be provided.

Where climbing access is not feasible due to reasons such as security, public liability etc, the design shall make provision for access by an elevated work platform (movable platform or EWP) e.g. Cherry pickers, scissor lift, spider lift.

It is the designer's responsibility to ensure that Safety in design identifies the risks involved in construction and operation of installed infrastructure.

## 13 Design Contracts

Where practicable, any contract documentation for the engagement of consultant design services shall include the requirement for person/s designing new or upgrades to assets/infrastructure to have attended Water Corporation sponsored Prevention of Falls Awareness for Designers training or a course of training approved by the Manager Human Resources in consultation with Manager Infrastructure Design.

The tender submission and any subsequent assignments would need to include objective evidence of attendance at such training.

Attendance at Prevention of Falls Awareness for Designers shall be at no cost to the Water Corporation however, Manager Human Resources may waive the cost of the course fee for courses organised by the Water Corporation.

## 14 Interim Control Measures

This Standard introduces a range of control measures that will require modifications to assets. It is acknowledged that it may take some time before existing infrastructure is upgraded to comply with this Standard.

In order to provide guidance to line managers and asset owners on appropriate control measures required before upgrades are completed, this Standard includes statements prefaced by "**Interim Measures**".

A program for the rollout of upgrades will be developed by Manager Strategic Asset Management and subsequent to funding being approved, a project manager will be appointed. The program should include the application of the Interim Measures.

Subsequent versions of this Standard will eliminate the Interim Measures as appropriate.

## 15 Working At Heights Situations

### 15.1 General

Working at heights is defined as a person working at any level where there is a potential for a fall from, through or into any place or thing. This may be:

- Above ground level
- At ground level

- Below ground level

*Edge protection shall be required where there is a potential for a fall from an edge **above 2 m**.*

For the purposes of this Standard, where a height is used it is generally in the context of where there is a risk of a fall from that height.

The priority order of the means of access to heights (above and below ground) shall be:

- Permanent – sloping walkway, stairway, step ladder, inclined rung ladder (2 stile), vertical rung ladder (2 stile). The use of single stile ladders should be avoided where practicable.
- Temporary - elevated work platform (EWP) – not for egress, scaffolding platform with a lashed portable ladder for access, step or trestle ladder, portable ladder lashed at top, portable ladder anchored at the base.

Any of the above items designed or used within the Water Corporation shall comply with the relevant Australian Standard as a minimum.

Working at heights includes, but not limited to, the following:

- Use of ladders - fixed and portable
- Maintenance work on storage tanks
- Working around holes and openings/pits/access chambers
- Working on levels or surfaces with no guardrail
- Removal of grid mesh or checker plate flooring panels
- Removal of covers, such as GATIC covers and hatch covers
- Working on slippery surfaces
- Moving from one surface to another
- Rigging
- Scaffold construction
- Construction of infrastructure prior to installation of walkways, gantries and guardrails
- Maintenance work on large mobile equipment
- Emergency rescue
- Working on or from fragile roofing
- Working on moving surfaces
- Accessing utility and truck trays, trailers and boats on trailers

Staff/contractors who are working where there is the risk of a fall from a height **greater than 3 m** shall not work alone except for routine tasks assessed as low risk for falls, where edge protection is permanently installed, a permanently fitted fall arrest system is used (e.g. Fallright) for situations defined in the Standard, and communications to a depot/others is available and has been tested.

### 15.2 Contractors and Tender Submissions

Contractors engaged by the Water Corporation may be required to work at heights as part of the scope of works.

Contractors working at heights shall as a minimum:

- Comply with the relevant requirements of this Standard including the Risk Profile – Working at Heights in Annex A to Appendix 3
- Provide their own height safety equipment that meets the requirements of this Standard. Equipment provided by the Water Corporation shall be stated in the contract

- Conduct JSAs or equivalent risk assessment procedures to determine if height hazards can be controlled adequately, prior to commencing the work
- Conduct induction procedures
- Suspend work if non-compliance with Water Corporation safety standards

A planning meeting shall be conducted by the contract manager with the contractor prior to commencement of the work, to include hazard identification, safety equipment, required competencies and necessary certificates.

Prior to commencement of work the contract manager shall sight any relevant working at height/equipment operator competency certificates to check currency for any individual working on the task.

### 15.2.1 Construction Tender Submissions

Where relevant, tender submissions shall include a plan for working at heights during construction, including the FIPS to be applied.

## 15.3 Supervision

Line managers/supervisors shall provide supervision to ensure that staff/contractors are not exposed to hazards and that they are taking reasonable care where there is a risk of falling from, through or into any place or thing.

Supervision by a competent person is important, especially if the people being supervised are undergoing training or are unfamiliar with the working environment.

Supervisory staff shall monitor the work to ensure that agreed safe work practices are followed. For example, monitoring the use and care of FIPS.

Where FIPS are used, supervisory staff shall ensure that:

- Only staff/contractors who have received training and instruction in relation to the system of work are authorised to carry out the work
- Staff/contractors use the fall injury prevention system in the correct manner
- Adequate safety and health systems are in place, are functional, and safe work practices have been adopted and are used

## 15.4 Frequency of Access to Heights

In some sections of this Standard reference is made to frequency of access.

In order to understand the context of the requirements of the Standard, a table of frequency of access is below.

The purpose of the table is to provide guidance on typical frequencies of access to assets/infrastructure where a person is deemed to be working at height. The frequency for activities such as a site visit where no climbing occurs or covers removed may well be different.

The frequency of access may influence the type and/or means of access. An example is for low access frequency to a pit < 2 m fit inclined ladder and not steps.

It is acknowledged that individual assets within the Asset Type may have different frequencies of access. The table does not cover construction and unplanned operations and maintenance activities. This table is not related to the frequency of confined space entry at a location that is deemed to be at height e.g. entering the wet well of a submersible wastewater pump station

**Table 1 - Frequency of Access to Heights**

Asset Type	< 1 Week	1 Week	1 Month	3 Months	6 Months	12 Months	1-2 yrs	> 2 yrs
1. Tank – drinking water – metro & Regional centres and towns in high tourist seasons (security check)	H	N/L						
2. Tank – drinking water – other locations	H		N		L			
3. Tank – drinking water – other locations < 3 m high	H			N	L			
4. Treatment plant large/medium – tank or similar structure	H	N	L					
5. Treatment plant small – tank or similar structure	H		N		L			
6. Dry well pump station floor		H	N		L			
7. Dam intake tower		H	N	L				
8. Pit – valve, pump, instrument equipment in complex		H		N	L			
9. Pit – other type internal to complex e.g. treatment plant pit		H		N	L			
10. Pit – other type external to complex			H		N	L		
11. Pump station wastewater submersible (removing covers)			H	N	L			
12. Main or rural drain				H	N		L	
13. Truck - tray of truck, storage box on tray	N	L						
14. Surge vessel vertical				H		N	L	
15. Roof of building						H	N	L
16. Primary sedimentation tank - cleaning				H		N	L	

**Legend:**

N – normal frequency - normal planned activities and being the most frequent activity  
H – high frequency  
L – low frequency

## **15.5 Confined Space Entry**

This Standard does not deal with confined space entry (CSE). However, there are some linkages with vertical CSE in prevention of falls situations prior to entry and compatibility with equipment used in CSE.

The Safe Working in Confined Spaces WC-OSH108 procedure provides for safe working in confined spaces associated with water, wastewater, irrigation and drainage assets, whether they are commissioned or non-commissioned.

In the event of a CSE it should be recognised that the potential for falls may arise, for example, after a pit cover is removed.

Work instructions and permits for CSE shall include control measures for prevention of falls.

### **15.5.1 Design**

Designers are required to identify assets which may be classified a confined space. These assets shall be designed in accordance with the hierarchy of control, adhering to the highest level possible.

## **16 Training in Working at Heights/Depths**

Training competencies for working at heights shall be defined by Manager Human Resources in consultation with Manager Strategic Asset Management, Manager OSH and Manager Infrastructure Design.

Training shall be conducted in accordance with the training courses outlined at Appendix 5.

Training shall include the relevant aspects of this Standard.

Height safety awareness training shall be conducted for:

- Staff and alliance contractors
- Supervisory staff
- Designers
- Rescue planning

Training for selected staff in Regions/Branches to be a “competent person” for the inspection of FIPS shall be conducted.

It is not intended that staff/contractors who attend a site infrequently are to attend the Staff and alliance contractors’ course and trained in the range of FIPS of the site. An example is for a site visit by senior management, where they need to climb a ladder fitted with a ladder climbing system, they will only require instruction on the harness and climbing system at the time of the visit.

For the purposes of training “Designers” include:

- Infrastructure design engineering staff – internal and external (consultants)
- Asset upgrade/creation project managers – internal and external
- Capital investment program managers involved in infrastructure projects – internal
- Mechanical and electrical/electronic planning staff
- Line managers of the above – internal

The training competencies for working at heights is at Appendix 5.

## **17 Edge Protection**

### **17.1 General**

Edge protection (often referred to as a guard rail system including toe board) is used to reduce the risk of a person falling from one level to another.

Edge protection shall be provided to the edge of a decking, fixed stair, landing, scaffold, suspended slab, formwork or falsework, where a person is at risk of falling **2 m or more**.

A fall injury prevention system (FIPS) shall be provided and used where a person is at risk of a fall of **3 m or more** unless edge protection (guardrails and toe board) complying with this Standard are in place.

### Notes:

1. The above two paragraphs are a requirement of the *OSH Act*
2. The requirement for **FIPS when working above 3 m** is covered in Appendix 4.

The hierarchy for prevention of falls from infrastructure shall be:

- Engineering out the need to gain access to infrastructure at heights (Elimination)
- Edge protection and safety grates (Isolation)
- Fall Injury Prevention Systems (FIPS) e.g. fall restraint
- Exclusion Zones & Safety Monitors (Administrative)

Where it is identified that the edge protection and/or grate creates a hindrance to safe operations, and all other safe options have been excluded, a lower level of control may be utilised. Where edge protection and/or grate is removed, an exclusion zone shall be erected and no personnel are to enter this zone unless tethered using approved Water Corporation FIPS. A JSA shall be completed for any task where edge protection is to be removed.

It is recognised that fall arrest systems on ladders (commonly known as a ladder climbing system) are necessary where stairways are not installed if the potential fall is greater than 3m.

## 17.2 Requirements

Guardrails shall comply with *AS 1657 Fixed Platforms, Walkways, Stairways and Ladders – Design, Construction*.

All new and existing guardrails are to have a self closing gate. Gates for new ladders shall be positioned in accordance with *AS 1657*. The self closing gate shall close securely once opened to prevent a person falling from height.

Note: Bunting, “Telstra” type barriers and hazard domes do not comply as fall prevention barriers as they are not fixed and can be knocked out of position.

### 17.2.1 Level work areas

- The guardrail system shall conform to *AS1657* to withstand a force as specified in this standard
- Top rails shall be at least 1000mm above the working surface
- Mid rails and toe boards shall be provided. However, wire mesh infill panels incorporating a toe board may be used instead of the mid rail
- If access points are required for equipment (for example, a davit with winch), they shall be protected adequately with lockable self closing safety gates, to prevent a person falling

### 17.2.2 Tanks, Dam Intake Towers and Similar Structures

All new and existing tanks and similar structures **greater than 3 m** in height shall be fitted with edge protection to the whole perimeter of a roof. Existing edge protection around hatches and existing anchor points on roofs are not required to be removed.

The roofs of Dam Intake Towers shall be fitted with a permanent fall restraint system such as a static line or anchorage points. Access to the roof shall be by a competent person only.

Davit points need to be installed in a position so as to be operated safely away from guardrails.

Ladder Stiles to extend 1m above top level of tank.

Table 2 below details the edge protection requirements for new and existing tanks.

**Table 2 - Tank Requirements**

Total Height to ground	Edge protection
<b>&gt;= 3m - New &amp; Existing</b>	Roof perimeter Edge protection with self closing gate required.
	Guardrail and SCG around tank hatch.
	For elevated tanks, Edge protection to be fitted to the deck (platform) beneath the tank in addition to roof perimeter edge protection.
<b>&lt; 3m – New &amp; Existing</b>	Where the roof is required to be accessed, assess the need for edge protection.
	Edge protection shall be fitted if any of the hazards in Table 21.2 apply.

**Table 3 – Ground Tanks < 3 m in Height - Hazard Identification**

Hazard	Hazard Elimination Option
1. Slippery roof surface	Apply slip resistant material at work area or fit non slip surface such a grid mesh
2. Sloping roof surface exceeding 15 <sup>0</sup>	
3. Uneven surface around normal work area. e.g. corrugated or channel type roof cladding	Fit even surface such as grid mesh over cladding at work area. e.g. around hatch
4. Uncovered valve pit below, anywhere on the perimeter	Retro fit a cover on the valve pit
5. Items below that may cause a spear injury. e.g. star picket	Remove hazard
6. A fall to another level, greater than 3 m, exists on any part of the perimeter	Deck / platform design
7. The ground slopes away from the base of the tank at an angle greater than 15 <sup>0</sup>	Backfill to level to at least 3 m from the tank wall
8. Open water on any part of the perimeter	
9. Normal frequency of access is weekly or greater	Review need for frequency of access
10. Any other hazard such that edge protection is deemed a necessary control measure	Consider eliminating the hazard

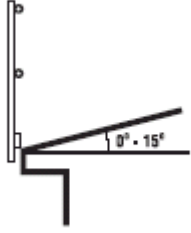
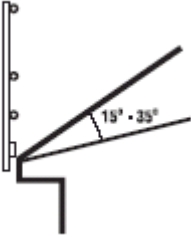
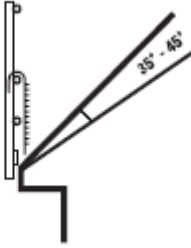
### 17.2.3 Severe Roof Slopes

A bottom rail above the toe board should be provided for more severe roof slopes. Both a mid rail and infill mesh panel will assist in preventing persons and objects from sliding off the roof

Refer to the *Prevention of Falls Code of Practice* for the requirement for different degrees of slope – note different treatments shown in diagrams below

Where roof slopes exceed 45 degrees, the slope is unsuitable to work on without a support system, such as a fall-arrest/restraint system or a scaffold catch platform, to prevent injury

If edge protection shall be used on roofs with slopes exceeding 15° from the horizontal, the edge protection shall be able to withstand the added impact forces, defined in AS 1170.1.

		
<p>A midrail and toe board are required between 0°-15°</p>	<p>Two lower midrails are required between 15°-35°</p>	<p>Fall restraint and mesh infill below midrail shall be used above 35°</p>

#### 17.2.4 Public areas

Edge protection other than the standard guardrail and toe board may be more appropriate in areas accessible to the public such as drainage structures and dams.

For such areas a risk assessment shall be conducted before deciding on the optimum type of edge protection. DS 62 Site Security Treatments includes types of fencing.

### 17.3 Safety Grates –

#### 17.3.1 Safety Grates - General

Portable and removable safety grates shall be designed to meet the following load and deflection criteria:

- Imposed actions as required for the category "Structures for access and working" in Table B1 of *AS 1170.1:2002 Structural design actions – Permanent, imposed and other actions* (Uniformly distributed load of 2.5 kPa and concentrated load of 1.1 kN)
- Load combination to be in accordance with *AS 1170.0:2002 Structural design actions – general principles*

Any opening in the grate for tasks such as inspection, hose down or sampling shall be no greater than 200 mm x 200 mm (or 200 mm diameter).

Where practicable, a lifting tool should be used to remove safety grates. The tool could be a rod with a hooked end and handle.

#### 17.3.2 Removable Safety Grates

A removable safety grate sits permanently over an opening, usually beneath a cover and may be hinged open or removed completely for access into the opening.

A removable safety grate shall be fitted beneath any cover over an opening, greater than 200 mm x 200 mm (or 200 mm diameter), required for normal / frequent inspection, entry or tasks at the surface level, such as at wet wells of submersible pump stations (see Section 21.4). This does not apply where the primary reason for removing the covers is to physically enter the opening and other control measures will be used.

Typically it is anticipated that portable grates will be used for access chambers. See section 21.3.3 for details of portable grates. However, a removable grate will be fitted on an access chamber subject to a risk assessment. Factors to consider are frequency of access and tasks to be carried out.

Removable safety grates shall be signposted with "No Step" or the international symbol of a person walking with diagonal line over with the words "No Step" below. See section 50 for details of sign requirements.

### 17.3.3 Portable Safety Grates

If a removable safety grate is not fitted beneath the cover, then a portable safety grate shall be used in accordance with the Water Corporation's procedure for Working Around Access Chambers. Distinct from a removable safety grate, a portable safety grate is brought to site.

Portable grates are to be secured with lugs/brackets such that the grate cannot be dislodged.

A portable grate shall not be secured by placing the access chamber cover on the grate.

### 17.4 Valve/Pump/Instrument Equipment Pits

Table 4 shows the minimum requirements for covered and uncovered pits:

**Table 4 - Minimum requirements for covered and uncovered pits**

Potential fall	Covered	Uncovered
<b>&gt; 300mm - New and Existing</b>	Permanent guardrail or shall have a temporary guardrail for when covers are removed, or hinged open, for operational purposes	Permanent Guardrails and Toeboards. Fixed Barrier
<b>&lt;300mm - New and Existing</b>	Required to be covered	Not applicable

Designs for new large pits shall provide a stairway and at least an inclined ladder for smaller pits. Upgrades to existing large pits are to include stairways or inclined ladders where practicable.

Step irons can be fitted to pits **shallower than 1 m** but only after all other options are considered. Step irons in existing pits deeper than 1 m are to be replaced with a stairway/steps, inclined ladder or vertical ladder, respectively in order of practicability. Replacement of step irons does not apply to sewer or drainage access chambers and water scour chambers or similar structures.

Where the height of the pit structure is greater than **300 mm** above ground level at the access point, external steps are to be provided in accordance with *AS 1657:1992 Fixed platforms, walkways, ladders and stairways- design, construction and installation* in order to provide safe access onto the structure before descending into the pit. This applies to existing and new pits.

Where the top of the pit structure is greater than **100 mm above ground level** a toe board is not required.

If a ladder is fitted, the stiles are to extend at least **1 m** above the cover or top of the structure. An alternative is to fix a stile bracket to the top of the pit. This also applies to pits fitted with step irons, located within Water Corporation sites/plants.

All pits fitted with guardrails are to have a self closing gate at the access point at the top. The gate shall open towards the person about to enter from the top. For new pits, the self closing gate shall be positioned in accordance with *AS 1657*, where practicable.

### 17.5 Protection of Holes or Openings in Flooring

Holes or openings in concrete floors shall, where practicable, be protected with embedded wire mesh and covered with material of adequate strength to prevent persons or objects entering or falling through.

All holes or openings greater than 200 mm x 200 mm, but less than 2 m x 2 m or with a diameter greater than 200 mm but less than 2 m, shall be covered or fitted with guardrails. Any hole or opening greater than 2m x 2m or with a diameter greater than 2m shall be fitted with guardrails.

Holes or openings in any other type of (non-concrete) floor shall be covered with material of adequate strength to prevent entry by objects or persons and be fixed securely to the floor.

If panels of grid mesh or checker plate flooring are removed and there is a risk of falling, edge protection shall be provided.

## **18 Tethering**

### **18.1 General**

Where elimination of a fall from height risk is not possible, and other engineered options are not practicable, the control measure to be utilised to protect a worker from falling is to ensure they are tethered to an approved and appropriate anchor point. The following are commonly used anchor points on WC assets.

### **18.2 Davit Arm**

The Davit arms in general use across the Water Corporation are primarily utilised for confined space entry. Their use for confined space entry enables the entrant to be securely supported during access and egress and in the event of rescue. The entrant is to be attached to the mast mounted winch via their front or rear "D", and the standby person is to be attached to the short lanyard attached to their front "D".

The davit arm should also be utilised for the following:

- By the standby person during confined space entries
- For activities around other unprotected openings where tethering is required.

The assembly of the davit arm is to be carried out by trained and competent personnel.

#### **18.2.1 Permanent Davit Mount**

Various types of permanent davit mounts have been installed on Water Corporation sites. These include flush mounts, side mounts and top mounts. The davit arm assembly is located into the relevant base unit located near the entry point.

#### **18.2.2 Davit Arm – Portable Base (C Base)**

The portable base unit is to be set up around the opening where no permanent base is available. It is to be set up as per manufacturer's instructions. The davit arm assembly is located into the receptacle on the portable base.

#### **18.2.3 Vehicles**

There are two methods of tethering to a vehicle in fall arrest which are permitted for Water Corporation personnel and contractors.

Both methods are only be used when there is no other practicable fall prevention method and must be approved by the job supervisor.

The two methods for tethering to a vehicle are:

Tethering to a vehicle using a Reece tow hitch attachment

Tethering to a truck mounted crane

For a details of the safe work method statements (SWMS) relating to these methods please refer to WC-OSH-SWMS-020 and WC-OSH-SWMS-021 which can be found on the Safe Job Planning section of the OSH home page.

#### **18.2.4 Ladder Climbing System (LCS)**

This is a wire rope that is installed on ladders to prevent a climber from falling. Attachment to a LCS requires a wire rope grab which connects to the users harness and to the wire rope. This ensures that if the climber were to stumble or lose contact with the ladder they will not fall as the connector will lock onto the rope. It is important to note that not all devices work with all ropes, rope size dictates which devices are useable on a given diameter rope.

### 19 Sloping Walkways

It is recognised that provision of a sloping walkway may be difficult to achieve on most Water Corporation infrastructure. However, at some sites such as a water storage complex, the valve/pump/instrument/equipment normally in a pit could be in a generous excavation and no pit structure would be required. Access would be via sloping walkway or roadway. A further example is at treatment plants where sloping walkways may be the best solution where small vertical distances are involved.

The angle of slope for a walkway may be up to 20°, preferably not steeper than 10°.

### 20 Stairways

#### 20.1 General

A stairway is the preferred means of access to a work area where large vertical distances are involved. Stairways can be straight flights or curved. The number of rises in any straight flights shall not exceed **18**.

In providing safe access to and egress from and movement around a work area, the installation of stairways shall be considered, taking into account:

- The frequency and number of people who may need to use the access to or egress from the work area
- Supervision and regular inspections shall be considered
- The location and space required for any plant, equipment or materials used or temporarily stored
- The safety of work surfaces the method of getting plant, equipment and materials to the work area
- Exposure of access ways to the weather (e.g. rain can make surfaces slippery and strong winds can cause loss of hand grip)
- The assessment of manual handling tasks, including considering the provision of mechanical lifting aids
- The provision of adequate natural or artificial lighting to all access ways
- The clearance of obstructions so that persons are able to move easily to and from the workplace
- Stairways shall have guardrails and toe boards on the landings with capping fitted on the ends of tubing



**Typical Compliant Stairways**

## **20.2 Stairways on Steel Framed Tank Stands, Elevated Tanks, Ground Tanks and Similar Structures**

External staged stairways, guard railing and security barriers shall be installed on new and existing ground level water storage tanks and similar structures where the top is **3 m** or higher and all tanks on steel frames. Stairways can be fitted to new tanks and similar structures **below 3 m** if a risk assessment determines this to be necessary.

Upgrades to ladders on tanks and similar structures including steel framed tank stands are to be stairways regardless of height, except below 3 m.

The stairway on steel framed tank stands shall be configured such that a person can safely exit at tank stand deck level and at the deck at the top of the tank.

For multiple tanks on a single framed stand or multiple adjoining tank stands, the tank stand decks and the decks at the top of the tank shall be linked with a safe walkway.

For centre column access elevated tanks stairway access shall be to the top of the tank and to the valve deck below the tank.

### **20.2.1 Interim Measures**

Fit a ladder climbing system to all ladders up to and including to the roof of the tank/s. Fit self closing gate and ladder cage on ladder from deck to top of tank.

Note. The design and cost implications and the practicability to fit stairways to tanks on a steel framed stand and elevated tanks are to be determined through a design review as part of the Prevention of Falls Implementation Program.

## **20.3 Security Barriers**

All stairways are to be fitted with a door/gate to prevent access by unauthorised persons. Refer to Guide to the Selection of Security Barriers Drawing Number GX54-7-0.

Basic requirements of the stair door/gate are:

- Ensure gate cannot be bypassed, that is, seal off gap between stair gate and tank with corrugated steel or fine mesh which prevents a hand and toehold
- For the barrier at first platform level, provide outrigger type barrier arrangement to stop climbing past outside and above the gate. (e.g. corrugated steel, fine mesh, barbed wire)
- Ensure guardrails cannot be used to assist climbing past the stair gate barrier.
- Conduits to gate for security alarm when required
- No climbing sign required in the tank wall at the entrance to the stairway. Signage shall comply with *Site Security, Public Safety and OSH Signage Standard S197*

For large tanks or where additional security is required a fenced compound is required at the base of the stairway. For sites with multiple assets, fenced compounds may be used to increase security.

The intent of the security standard is to provide security as well as prevent people from injuring themselves.

Requirements for fenced compounds are:

- 2.4m high corrugated steel type panelling with 3 strands barbed wire above
- Fix corrugated steel sheeting with round head screws, not hex (tamper resistant)
- Stairway access door to be flush on outside, use Lockwood 002 deadlatch, (Bi- Lock system). Key only opening from outside
- Fencing is to be installed a sufficient distance from stairwell stanchions, the stairwell and other vertical protrusion so as to prevent the fence from being used to aid climbing upon the stairwell
- Gap under fence to be maximum 75 mm

- Ground surface under fence to be such that digging is difficult to achieve (e.g. bitumen, compacted road base, concrete strip)
- No apertures are to be placed in the sheeting, at the door or any other location
- No site services (power/water) are to be installed outside the stairwell access area.
- Secure profile keying
- Motion sensitive light to be installed within the compound area activating upon entry to the compound. (where necessary)
- Signage shall comply with *Site Security, Public Safety and OSH Signage Standard S197*
- Stairwell compound door is to have a "warning security systems" and "no climbing

## 21 Steps and Flooring

Where practicable steps shall have a handrail on at least one side. As a guide, the maximum number of rises of steps without a handrail should be 3.

Refer to the Walkways and Platforms on Infrastructure section for the surface treatment requirements for steps and flooring.

Non grid mesh type steps, such as concrete or brick are to have a non slip surface.



**Example of a Non Slip Treatment on Edge of Brick Steps**

## 22 Fixed Ladders

### 22.1 General

Ladders are to be used as a means of access to or egress from a work area, not as a working platform. Working from fixed ladders is not permitted. Fixed ladders include step ladders, inclined rung ladders and vertical rung ladders.

Where practicable the hierarchy for permanent means of access to infrastructure at heights (above and below ground) is sloping walkway, stairway, step ladder, inclined rung ladder and lastly vertical rung ladder.

Existing vertical ladders below **3 m** are to be reconfigured to inclined ladders unless space limitations or the ability to rescue make this requirement not practicable.

On new infrastructure below **3 m** in height, where stairways or step ladders are impractical due to space or other restrictions, an inclined ladder shall be fitted.

On new infrastructure above 3 m in height, where stairways are impractical due to space or other restrictions, staged fixed ladders shall be fitted with landings at flights of not more than 3 m. A ladder climbing system shall be fitted to ladders above 3 m or where the distance to ground is greater than 3 m. Except where the landing has been specifically designed to prevent falls (in accordance with AS1657)

On existing infrastructure where a ladder exceeds **6 m** a rest platform shall be fitted, if space permits, such that there is not a continuous climb of more than **6 m**.

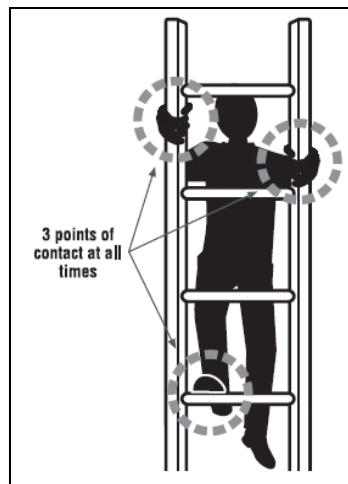
A self closing gate shall be fitted at the access point at the top of fixed ladders in accordance with AS 1657. The gate shall swing away from the person ascending.

Rungs on new and existing ladders shall be slip resistant or have slip resistant material applied.

Ladder stiles shall extend at least **1 m** above the exit level at the top.

Only ladders compliant with *AS 1657-1992 Fixed platforms, walkways, stairways and ladders - Design, construction and installation* are to be installed at Water Corporation sites.

**Three Points of Contact** with the ladder shall be maintained at all times, i.e. two feet and one hand, two hands and one foot. Tools and materials shall not be carried by hand. They shall be in a tool belt, side pouch or backpack or moved to the work platform in a pulley basket/bucket/container.



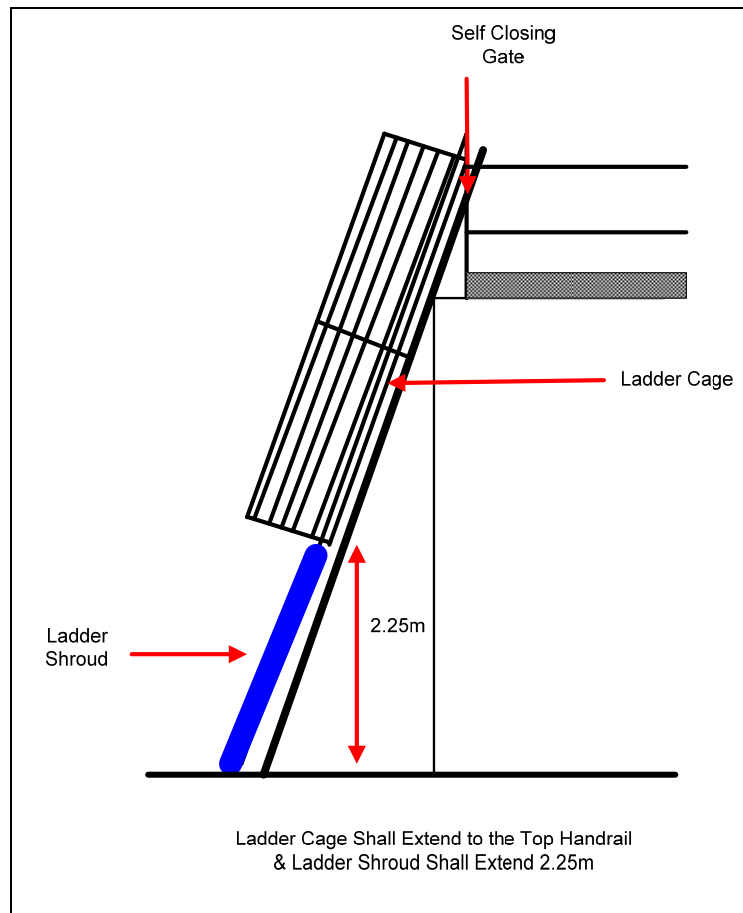
## 22.2 Ladder Cages

The Water Corporation will continue with the use of ladder cages where existing.

- Ladder cages are to be covered with flat steel strip material and not mesh
- Where the ladder and ladder cage is attached to the side of the tank or similar structure, the ladder cage shall extend to the top of the guardrail
- Ladders below 3 m do not require a ladder cage

New ladders or ladder upgrades above 3 m vertical height or above 3 m from ground level shall be fitted with a ladder climbing system and not a ladder cage.

If a fully enclosed ladder (steel sheet covered, not mesh) is required as an outcome of a SG 81 Site Security and Public Safety Assessment, a ladder climbing system shall be fitted as below.



### 22.3 Ladders in Wastewater Wet Wells and Submersible Pump Stations

The purpose of the ladder in a wet well is as the primary ascent/descent mechanism, to provide stability for the person entering the wet well in a controlled Confined Space Entry (CSE) or exit in which the person is tethered and wears a fall arrest harness. In new submersible wastewater pump stations extendible ladder stiles shall be fitted to the top of the ladder such that they extend 1 m above ground, as per AS 1657.

Existing ladders without extendible stiles shall be fitted with a portable stile extension to reach **1 m above ground level**.

In existing infrastructure where a fixed ladder is not fitted, a purpose designed portable ladder may be used and shall be secured at the top. This should be a bracket fixed to the concrete under the cover, and shall only be used with the person entering being attached to an externally fixed fall arrest device.

Access into wastewater wet well pump stations is to be designed with reference to section 19.5 of the standard.

A wastewater wet well is excluded from the requirement to have intermediate landing every 3 metres as outlined in section 25.1. An intermediate landing will inhibit maintenance and safety rescue activities while undertaken in a confined space.

### 22.4 Guard on Ladders

All ladders providing access to tanks and similar structures are to be fitted with a ladder guard/shroud/cover as risk assessed by a qualified person in accordance with D S62 Security Treatments (also refer to Drawing FW65-30-30 and 31).

## **23 Ladder Climbing Systems**

### **23.1 General**

Ladder safety/climbing systems are permanent fall-arrest systems that provide continuous fall protection for persons using ladders.

An example of a system is: The Beaver Ladder Safety System

The Corporation has standardised on the Beaver system for its retrofit project. Any new systems shall be compatible with this.

On all new and existing infrastructure above 3 m in height, where a stairway cannot be fitted, a ladder climbing system shall be fitted to the ladder.

Where practicable, on all new infrastructures below 3 m a stairway or steps shall be fitted. If space limitations do not permit this, a ladder climbing system may be installed if a risk assessment determines that it is necessary.

A ladder climbing system shall be designed such that a person can engage/disengage behind edge protection/self closing gate.

Ladder climbing systems shall not be fitted in wastewater wet wells, water tanks and similar structures. Confined space entry procedure shall apply.

Specifications and use of ladder climbing system include:

- The climber shall be in fall arrest throughout the total climb and only disengage behind a self closing gate.
- Connection of ladder climbing systems shall only be at the chest attachment point on the fall arrest harness. The karabiner or lanyard assembly should be a maximum of 300 mm long
- The locking device should not be capable of damaging the line in the event of a fall
- The point of connection onto the ladder climbing system by the climber must be near the base of the ladder (below 1.2 m) to allow connection before ascending. The LCS extension shall also extend approximately 1.5m above the point of disconnection to enable the climber to disengage behind a self closing gate.
- Free fall should be limited to a maximum of 600 mm
- LCS shall comply with *AS/NZS 1891.3 and AS/NZS 1891.4*.
- The entire device shall be capable of sustaining a load of 15 kN (approximately equivalent to 1500 kg)
- Be positioned as close to the opening side of the self closing gate as practicable

Refer to Appendix 4, FIPS for equipment used for ladder climbing systems

### **23.2 Emergency Exit Ladders**

Where a ladder is provided for exit in an emergency and the main access is by a stairway, the ladder need not be fitted with a ladder climbing system.

Examples of the application of emergency exit ladders are:

- A large below ground pumping station where the entry is by a stairway or steps at one end of the station and the emergency exit ladder to the top is at the other end
- Above ground tanks linked at the top by a walkway where the normal access is by a stairway with an emergency exit ladder to ground at the other end of the walkway system

The rationale for not requiring a ladder climbing system includes:

- The likelihood of inundation or other incidents, in a below ground situation, that would require the use of a ladder as an emergency exit is extremely low
- The likelihood of an incident, in an above ground situation, that would require the use of a ladder as an emergency exit is extremely low
- The likelihood a falling from a ladder is low considering the likely frequency of incidents that would require the use of the ladder as an emergency exit
- A stairway or steps offer a quicker exit, if accessible
- The requirement to wear a safety harness and carry a shuttle at all times when on or in the infrastructure would not be acceptable by staff and indeed they may simply not wear the equipment

Should the asset owner, operator or the line manager require a ladder climbing system be fitted to the ladder, staff entering by the stairway shall wear a safety harness at all times and take the ladder climbing system shuttle device.

Exit signage and where applicable, safety harness signage, shall be erected.

Above or Below Ground		Signage
1.	To access below ground	<ul style="list-style-type: none"> <li>• Exit sign at top on self closing gate of ladder, facing outwards to walkway</li> <li>• Emergency Exit sign at bottom near ladder</li> <li>• Exit sign at bottom near stairway or steps</li> </ul>
	If ladder climbing system fitted to ladder	Safety Harness Must Be Worn sign at top of stairway or steps
2.	To access above ground	<ul style="list-style-type: none"> <li>• Emergency Exit sign at top near ladder or on self closing gate of ladder, facing outwards to walkway, if gate fitted</li> <li>• Exit sign at bottom near ladder</li> <li>• Exit sign at top near stairway or steps</li> </ul>
	If ladder climbing system fitted to ladder	Safety Harness Must Be Worn sign at bottom of stairway or steps

## 24 Access Onto Large Pipes

Climbing onto or working on large pipes is a hazardous activity e.g. standing on a large pipe to operate a scour valve.

### 24.1 Above Ground Mains or Fully Exposed Mains

Where practicable, access to valves and the top of the main adjacent should be from a fixed platform, with edge protection, and with stairs/steps/inclined ladder leading to the platform.

In the absence of a fixed platform, a portable device or scaffolding, with ladder and platform, temporarily attached to the pipe shall be used.



**Example of a Portable Pipe Access Platform  
(Available from Central Workshops)**

Basic specifications of the above example are:

- The maximum diameter of pipes that the overpass can fit is DN 1400
- The maximum height of the portable ladder is 3 m

## 24.2 Part Exposed Mains

For partly exposed mains, e.g. part excavation for repair in the event of a burst, a temporary platform shall be provided for safe access.

## 25 Portable Ladders

### 25.1 General

There is a greater risk of a fall from a portable ladder than from a fixed ladder.

Portable ladders shall not be used as a work platform and safer means of access shall be considered instead of using a portable ladder e.g. EWP for above ground and work box (personnel cage) for below ground. If an EWP is not practicable, light duty tasks may be performed from a step platform or trestle ladder (see 'Step and Trestle Ladders' below for requirements) or a mobile/fixed scaffold.

It is recognised that in some confined space environments, the use of a lashed portable ladder as a secondary fall protection device (for stabilisation) is acceptable following a risk assessment.

Extension or single ladders may be used as a means of access to or egress from a work area, however, this is the least preferred option for access to heights and requires that the ladder is lashed at the top and anchored at the base. See below for requirements for lashed/anchored portable ladders.

A lashed portable ladder shall not be used for access greater than a vertical height of **3 m** from ground level to the climber's feet.

A lashed portable ladder may be used for access to heights/depths from **3 m to 5 m** providing a davit and Type 3 fall arrest system is used for the climber. Where descent **greater than 5 m** is required in an excavation, scaffolding, platforms and lashed ladders should be utilised.

Only ladders compliant with *AS 1892.5-1999 Portable ladders Part 5: Selection, safe use and care* shall be used within Water Corporation sites.

Portable ladders shall be used in accordance with specific safety standards which are detailed in *Section 3.26 of the Occupational Safety and Health Regulations 1996* and are included below.

### 25.1.1 Lashed/Anchored Portable Ladders

Non-self supporting ladders shall be lashed at the top and secured at the base. Where lashing is not practicable, other precautions shall be taken so as to eliminate the risk of ladder movement e.g. footing the ladder. Lashing at the top shall be in accordance with *AS 1892.5-1999 Portable ladders Part 5: Selection, safe use and care*.

Anchorage at the base shall be:

Buried to between the second and third rung from the bottom end

Secured to a fixed mounting base e.g. a steel rail, housing bracket bolted to concrete

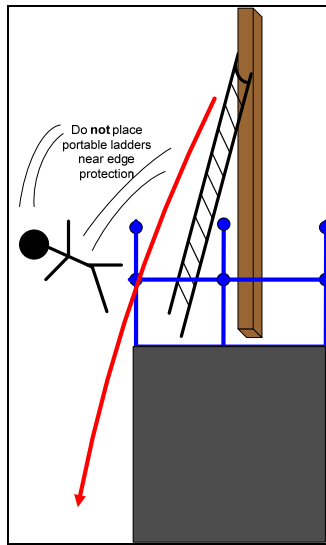
### 25.1.2 Safe Procedure for Lashing a Portable Ladder

Always ensure that someone foots the ladder for the initial climb or the ladder is buried or secured by a footing bracket.

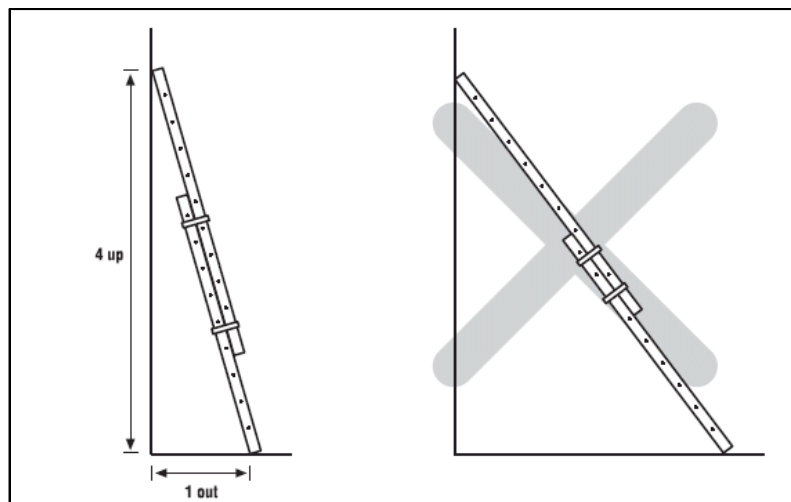
Once the ladder has been secured at the top and anchored at the base or with someone footing the base of the ladder, access to a structure is allowed.

## 25.2 Portable Ladder Checklist

- They are used only for access to or egress from a working area, not as a working platform Consider an elevating work platform or scaffolding for safer access
- There is a firm and level work platform, free from obstructions, to step onto from the ladder
- The ladder extends at least 900 mm above the stepping-off point on the working platform
- Sufficient platform area shall be provided at the stepping off point
- Edge protection is provided at the stepping off point where people access the working platform
- Ladders should be placed on a firm and level footing. Ladders should not be used on slippery surfaces unless suitable means to prevent slipping are employed. Stiles are not to be supported by boxes, loose bricks or other loose packing or unstable surfaces
- When circumstances arise that a portable ladder is the only means of access, a risk assessment shall be conducted
- Three points of contact with the ladder shall be maintained at all times, i.e. two feet and one hand, two hands and one foot. Tools and materials shall not be carried by hand. They should be in a tool belt, side pouch or backpack
- Portable ladders are not to be used close to edge protection where an operator could potentially fall from one level to another beyond the edge protection (see figure below)



- The distance between the ladder base and the supporting structure should be about 1 m for every 4 m of working ladder height. If the base of the ladder is placed too far from the wall, sudden slipping can occur



**Safe Arrangement**

**Unsafe Arrangement**

- The footing of the ladder should be horizontal to ensure vertical alignment of ladder
- Always position the ladder so that the rungs are at a right angle to the edge of the working platform (i.e. the roof, wall, scaffolding, platform)
- All the locking devices on step or trestle ladders are secure
- The ladder shall be in good condition. Before it is used, the ladder shall be inspected for faults, such as broken rungs, rails and footing
- Damaged ladders shall be removed from service
- The ladder shall be the correct height for access. Keep the body centred between stiles at all times
- If used at a construction site, the ladder shall not be suspended from a parapet hook
- The ladder is not placed so that the weight of the ladder and any person using the ladder is supported by the rungs

- The ladder is always faced while climbing up or down
- Materials or tools are not carried while climbing the ladder. Tools shall be carried in a tool belt, side pouch or back pack. Consider using a tool strap
- No person shall stand on a ladder any higher than 900 mm from the top of the ladder (usually 3rd rung down from top deck)
- No other person is allowed on the ladder at the same time
- Slip resistant base, rungs or steps are provided
- Slip resistant footwear to be worn
- Metal or wire bound ladders are never used close to energised power lines and non-metallic ladders shall be used instead
- Ladders shall not be used in access areas or next to doors where hot work, such as welding or oxy cutting is being undertaken
- Ensure signage/cones/barricading are used to warn people of the presence of a ladder

### **25.3 Step Platforms and Trestle Ladders**

Trestle ladders shall be used only for light duty work and the minimum width of the working platform shall be **450 mm**.

Work shall not be performed on a trestle platform that is **2 m** above ground level unless edge protection is incorporated.

A step platform, incorporating edge protection is the preferred type. The platform shall be not be higher than **2 m** from the ground unless fitted with a complying guardrail whereby **3 m** shall apply.



#### **Ensure Step Platforms are Locked and Secure before Climbing**

Alternatives to trestle ladders should be considered. There is a wide variety of working platforms now available for use in all circumstances, including elevated work platforms (EWP), light duty aluminium mobile scaffolds, boom arms and modular scaffolding.

## 26 Temporary Work Platforms

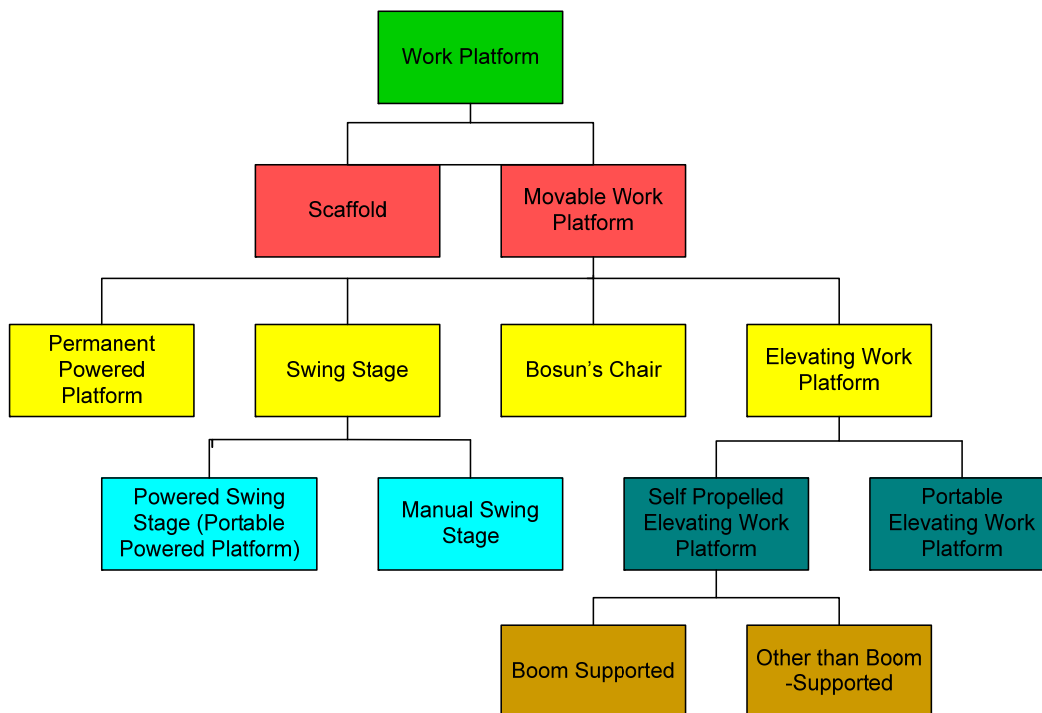
### 26.1 General

Walkways and platforms (an area at which work or rest is carried out, which is elevated above the surrounding floor / ground level) shall be made of non-slip materials or have a non-slip treatment applied to them.

Walkways, access ways and working platforms are to comply with *AS 1657 Fixed Platforms, Walkways, Stairways and Ladders – Design, Construction.*"

Where a fixed platform is not available, a temporary work platform may be required. Depending on the situation, different types of working platforms can be considered. These include:

- Elevated work platform (EWP)
- Scaffolding platform with a lashed portable ladder for access
- Step platform
- Step or trestle ladder (covered in previous section)
- Work box (personnel cage)
- Bosun's chair



**Types of Work Platforms**

It should be noted that all of the above examples do not have the option to exit the working platform except for scaffolding and work boxes (personnel cages).

Where these devices are being used, ensure signage is used to warn people of work above.

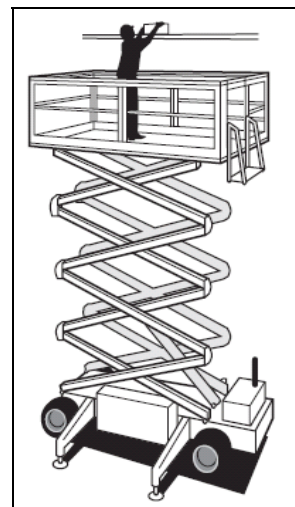
If other personnel carrying devices are required an external contractor shall be engaged. If this situation should arise the site manager shall consult with Manager OSH.

## 26.2 Elevated Work Platforms (EWP)

Elevated work platform means a movable work platform that self-elevates to overhead work locations. EWPs include cherry pickers, scissor lifts and spider lifts.

Elevated work platforms with a secondary fall protection system shall be used where no permanent work platform is available, in preference to portable ladders and where the work can be carried out from the confines of the EWP. The secondary fall protection system within the EWP shall be a lanyard of the shortest possible working length to keep the operator in restraint so they cannot get out of the bucket or work platform. Most EWPs are not designed to take a dynamic load of 15 kN on the outside of the bucket.

An EWP shall only be used as a means of access or egress to a work area if a supervisor or person having control of access to the workplace has assessed or had a competent person assess that a proposed change in use does not increase the risk of injury or harm occurring in accordance with *OSH Regulation 4.37*.



**Elevated Work Platforms**

The person in charge of the workplace shall ensure that the EWP is maintained, inspected and operated:

- In accordance with the manufacturer or designer's written instructions, or
- If it is not practicable to obtain those instructions, in accordance with written instructions approved by the WorkSafe Western Australia Commissioner, or
- If it is not practicable to do either of the above, in accordance with Australian Standards, *AS 2550.1 Cranes, Hoists and Winches – Safe Use - General Requirements* or *AS 1418.10 Cranes (Including Hoists and Winches) – Elevating Work Platforms*, however, there are exclusions for certain types of elevating work platforms – refer to *Regulation 4.54 (5)* for more details

The Australian Standards applicable to elevating work platforms are:

- *AS 1418.1 Cranes, Hoists and Winches – General Requirements*
- *AS 1418.10 Cranes (Including Hoists and Winches) – Elevating Work Platforms*
- *AS 2550.1 Cranes, Hoists and Winches – Safe Use – General Requirements*
- *AS 2250.10 Cranes – Safe Use – Elevating Work Platforms*

Safety requirements include:

- Only certified personnel are to operate such equipment and must be trained in the safe operating procedures for the particular brand and type of equipment
- The platforms should only be used as working platforms not as a means of access to and egress from a work area

- Unless designed for rough terrain, the platforms shall be used only on a solid level surface
- The surface area shall be checked to make sure that there are no penetrations or obstructions which could cause uncontrolled movement or overturning of the platform
- When designed as rough terrain platforms, the manufacturer's instructions shall be consulted for information on safe operation
- The training provided shall include safe use of the fall-arrest equipment and emergency rescue procedures
- Staff/contractors working in cherry pickers shall wear an anchored safety harness and lanyard incorporating a shock absorber as precaution against mechanical failure of the basket. The lanyard should be as short as possible. Fall-arrest systems are not required to be worn on scissor lift type elevating work platforms
- Staff/contractors operating cherry pickers with boom lengths exceeding 11 m shall have an appropriate certificate of competency

#### 26.2.1 Fall Protection on Moveable Platforms

Users of moveable platforms such as elevated work platforms (EWP) and building maintenance units (BMU) swing stages may find difficulty in providing adequately for the anchoring of fall-arrest equipment to the platforms. In some instances it will not be possible to protect workers in a free fall situation. In such cases a means of restraint designed to prevent a free fall shall be substituted.

The following are requirements and recommendations for the fall protection of people working on moveable platforms:

- The operator shall be limited to the use of a restraint system only, i.e. use of equipment which will prevent the operator reaching or climbing to a position from which any fall, free, limited or restrained, is possible
- In a potential free-fall situation the possibility of encountering the pendulum effect should be considered. This can occur when the anchorage point is neither directly above nor directly behind the operator at the point at which the fall occurs. A typical case is a fall from one end of a swing stage where the operator is anchored to the centre of the stage. A horizontal lifeline or rail within the stage is a possible solution provided adequate strength end anchorages can be found

### 26.3 Scaffolding

A person who erects or dismantles a scaffold at a workplace shall ensure that the erection or dismantling, as the case may be, is done in accordance with the relevant requirements of *AS/NZS 1576 Scaffolding series* and *AS 1576 Guidelines for Scaffolding*.

Nets and mesh should also be considered if scaffolding is in use. See page 34 of the *Code of Practice for Prevention of Falls at Workplaces* and the scaffolding section of the risk profile at Annex A to Appendix 3.

#### 26.3.1 Mobile Scaffolding

A Basic Scaffolding Certificate must be acquired to dismantle or assemble a prefabricated mobile scaffold **higher than 4 m**. People without a scaffolding certificate can dismantle/assemble a mobile scaffold only while under supervision by a certified scaffolder. A scaffolding certificate is not required to use a mobile scaffold.



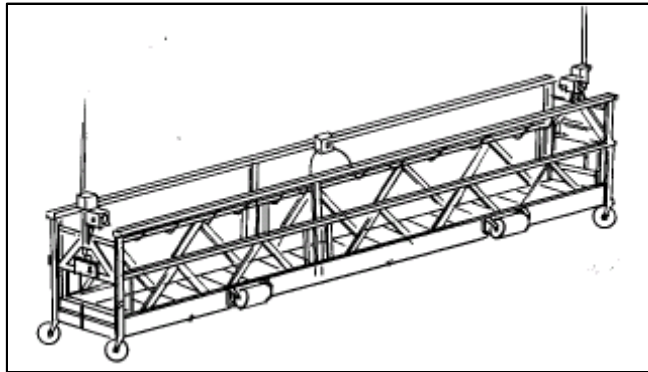
### **Mobile Scaffolding**

The following are requirements and recommendations for the fall protection of people working on mobile scaffolding:

- Post a sign indicating that only authorised staff are allowed to use mobile scaffold
- Mobile scaffold must be used only on a hard level surface and must not be located closer than 1 m to any slab edge, penetration or other stepdown, unless a fixed fence or guardrail is in place
- Check for physical defects before every use, including the access ladder
- Ensure the scaffold is level
- Ensure all sections are pinned or appropriately secured
- Keep scaffold loads to a minimum (including tools and other equipment) and remove when the scaffold is not in use. Do not exceed the scaffold's working load (refer to manufacturer's manual)
- Heavy tools, equipment, and supplies must be hoisted up rather than carried up by hand
- All castors shall be locked or chocked against any possible movement. Castors shall comply with AS 1576.2 and shall be capable of being locked when work is being performed from the scaffold
- Where the castors incorporate adjustable legs, the gradient of the surface shall not exceed 5 degrees, unless provision is made to take the load off the castors during use of the scaffold
- Where practicable, portable barriers and lights should be placed around the scaffold while in use
- Ensure guardrails and toe boards are in place on all open sides
- Never move the scaffold while someone is on it
- Secure materials before moving the mobile scaffold
- Remove the loads including tools after using the scaffold

#### **26.3.2 Light Duty Suspended Stage**

A suspended scaffold incorporates a suspended platform that is capable of being raised or lowered when in use. An example of a suspended scaffold is a light duty suspended stage (swing stage scaffold)



**An example of a light duty suspended stage with two wire ropes to each winch  
A vertical lifeline shall be used**

Light duty suspension scaffolds are perhaps the most common type of suspended scaffold. Hung by ropes or cables connected to stirrups at each end of the platform.

Control measures should be implemented for each component of a suspended scaffold system including suspension systems, scaffold hoists, cradles and trolleys.

When working in a light duty suspended stage suspended with one wire rope to each winch, a safety harness and lanyard, attached to an independent anchored lifeline, shall be worn.

Where the light duty suspended stage is suspended by 2 wire ropes to each winch, a safety harness and lanyard shall be attached to suitable steel components of the swing stage.

Note: Use of this device by Water Corporation staff is not encouraged. If it is considered there is no alternative, the line manager shall seek advice from Manager OSH prior to using this device.

#### **26.4 Work Box (Personnel Cage)**

Work boxes may be used as a temporary work platform by conveying personnel with tools and work material to a work location by crane. Personnel are required to work within the confines of the work box. Work boxes shall not be used for unloading personnel, with the exception outlined below, or bulk materials or for the removal of debris or scrap.

Where a work box is required to access a roof or below ground, a supervisor or person having control of access to the workplace shall have assessed or had a competent person assess that a proposed change in use does not increase the risk of injury or harm occurring in accordance with *OSH Regulation 4.37*.

A platform for the work box to rest shall be used to prevent damage to the cladding/roof structure.

Operators working in a work box are to work in fall restraint at all times. Work boxes shall be fitted with a rated fall arrest anchor point (15 kN) on the floor of the work box. The secondary fall protection system within the work box shall be a lanyard of the shortest possible working length to keep the operator in restraint so they cannot get out of the bucket or work platform

The maximum number of personnel in a work box shall be one, unless the work box has been designed for a greater number of personnel.

Work boxes shall only be used where other means of access are unsafe or impracticable.

Work boxes shall be designed only for use of personnel with the minimum tools and materials required to perform the necessary work.

If, at a workplace, a person is to ride in a work box suspended from a crane, each responsible person at the workplace must ensure that both the rider and the driver of the crane have been given written instructions for the use of the crane in those circumstances, setting out the conditions of use, and signed by both the responsible person and a competent person.

Work boxes shall be inspected after use by the user for damage and every **2 years** as part of a planned inspection program. Inspections shall be a SAP Planned Maintenance task.

Where a work box is found to be faulty or damaged it shall be taken out of service and tagged until the work box can be repaired.

Design and marking shall be in accordance with *AS 1418. Cranes (including hoists and winches) Part 17: Design and construction of work boxes*. The design shall be registered with WorkSafe.

### 26.4.1 Work Box on Crane Checklist

The safety requirements and considerations include:

- Other working platforms, such as an elevating working platform or scaffold, are used as an alternative to the work box, if they are practical
- The work box should not be suspended over people
- A suitable and adequate work box, designed for the purpose, is used and securely attached to the crane. The work box, lifting attachments and records should be checked by a competent person before use
- The work box is fitted with a suitable anchorage capable of withstanding the fall forces specified in *AS/NZS 1891.4*. Workers must be attached to the anchorage by a lanyard and harness unless the work box is fully enclosed
- Workers should not enter or leave the work box when it is elevated unless a risk assessment is conducted (except in an emergency)
- The crane is fitted with the means to safely lower it in an emergency or a power supply failure
- The crane is suitably stabilized at all times while the work box is used
- The crane has 'drive up' and 'drive-down' controls on both the hoisting and luffing motions and those controls are used. No declutching allowing free fall to be used while a work box is in use
- An effective means of communication, between any person in the work box and the operator, is provided
- The crane is fitted with a safely hook and moused accordingly
- The operator remains at the controls of the crane at all times



**Work box (Personnel cage)**

### 26.5 Bosun's Chair

A bosun's chair is a device used to suspend a person from a rope in order to perform work aloft. It is distinguished from a climbing harness by the inclusion of a more or less rigid seat, providing more comfort than even the best padded straps for long term use. In exchange, the bosun's chair does not allow the freedom of movement necessary for climbing, and the occupant is generally hoisted or lowered into place using the rope alone.

Some bosun's chairs consist of little more than a short plank and a suitable set of ropes to suspend it from. These are usually used with a separate harness in case the user should slip off the plank.

Note: Use of this device by Water Corporation staff is not encouraged. If it is considered there is no alternative, the line manager shall seek advice from Manager OSH prior to using this device.



**Bosun's Chair**

## **27 Moving Components from/to Heights**

### **27.1 General**

When there is a need to manually transfer components from one level to another, edge protection or fall restraint devices are required. In such situations it is important to assess the risk and complete a JSA.

The assessment should include the option to utilise an elevated work platform (EWP) or crane.

Where there is a frequent requirement to move components/tools from one level to another, consideration shall be given to installing a permanent lifting aid.

Where a davit is installed, equipment can be moved using a tool/equipment bucket. This eliminates the manual handling of tools/equipment when climbing.



**Examples of Tool/Equipment Buckets  
(Available from Central Workshops)**

Where practicable, in an open deck dry well wastewater pump stations, a simple winch and basket arrangement shall be fitted to the guardrail.



**Example of Winch and Basket  
(Available from Central Workshops)**

The rating/load capacity of equipment used to move items from one level to another should be known before use and shall not be used if inadequate for the task. Where practicable, items should be marked with the safe working capacity. Drawings of tool/equipment buckets and winch and basket are in the Drawing Management System.

## **27.2 Climbing Obstacles**

When a physical obstacle to entry to a site is encountered, no attempt should be made to climb over or through the obstacle.

Obstacles include farm fences, guardrails and low walls, including those at residential and commercial properties.

In the case of a farm fence, entry shall be through a gate in the fence. It is acknowledged that such access points can be some distance from the required site. If the gate is locked and the key cannot be obtained, the landowner should be advised of the access need and an appointment made to enter the site.

For an obstacle at an operational site where access over is required, suitable steps and handrail shall be provided. An example is a bund at a treatment plant.



**Example of Steps for Accessing a High Walled Bund**

## **28 Towers, Masts and Poles**

### **28.1.1 Towers and Masts**

Towers such as those supporting SCADA or communications providers equipment are not to be climbed by Water Corporation staff/alliance contractors. If the tower on Water Corporation property solely supports other than Water Corporation equipment then the owner shall be required to provide a physical barrier (e.g. locked ladder guard) to prevent access by other than the owner.

Agreements for the use of Water Corporation towers or any structure to support communication providers' equipment are to include the requirements of the *Code of Practice for the Prevention of Falls* and require the contractor to comply with all relevant WA height safety legislation and AS/NZS Standards.

Pole masts and framed towers > 3 m from the ground, supporting communications equipment such as SCADA are not to be climbed by staff/alliance contractors. EWP should be used or a suitably qualified and experienced working at height contractor utilised.

### 28.1.2 Poles

Tilt poles shall only be installed if a risk assessment reveals no practicable alternative to gaining access to the top of a pole e.g. use of EWP not practicable.

Where necessary tilt (hinged) poles may be used such that the equipment at the top can be maintained at ground level when the pole is lowered. This shall include poles supporting lighting and wind socks.

An alternative to the tilt pole for lighting is the "safe swivel light pole". This type of pole is suitable for use in treatment plants where lighting on a pole, at low height, is required.

DS 42-03 Scheme SCADA Equipment and Installations, Section 1.2.2 provides the requirements for the use of rigid free standing poles in preference to hinged poles for SCADA antennae. Under some circumstances certain conditions can apply for hinged antenna poles including the pole height to be < 20 m.



**Example of a SCADA Antenna Tilt (hinged) Pole**



**Example of a Safe Swivel Light Pole**

## **29 Communications Equipment on Water Corporation Structures**

Agreements/contracts with communications providers (e.g. Telstra, Vodaphone) or other organisations (e.g. Police) that allow placement of their equipment on Water Corporation structures are to include the requirement for compliance to the Act, Regulations and the Code, related to prevention of falls, for the erection and maintenance of their equipment.

Where the equipment is placed, such that the Water Corporation's edge protection for our operations is not adequate, the company shall install edge protection or install and use a fall arrest/restraint system at their cost, including the formal process of inspection of the fixed equipment at no cost to the Water Corporation. This cost could be charged to the company through an access agreement.

The agreement/contract shall include that the Water Corporation may use any edge protection, fixed fall arrest/restraint systems on the structure that has been installed by the contractor, that the contractor shall provide height safety training for their staff or agents and the existing Water Corporation ladder climbing system shall be used.



**Tank with Communications Equipment Owned by Others**

## **30 Roofing**

### **30.1 Working on Roofs on Buildings**

Roofs on buildings shall not be worked upon unless a risk assessment has been conducted and control measures determined. Control measures may depend on the slope of the roof, frequency of access and equipment required for the task. Suitable control measures are:

- Edge protection complying with this Standard
- FIPS e.g. static lines and rope grabs
- Control zones (only if working on a low roof with a low slope and for less frequent tasks)



**Static Line and Rope Grab  
Roof at Beenup Waste Water Treatment Plant**

All roof structures are to comply with the relevant Australian Standard including the need for walking on and maintenance loading.

Design to give consideration for the appropriate means of accessing the roof

- Internal access via stairway or fixed ladder
- External access via stairway or fixed ladder
- Use of a work box (personnel cage)

### 30.1.1 Control Zones and Safety Monitors

If the use of a fall arrest system is not practicable, or will result in a hazard greater than if the system was not used, a "control zone" with or without a "safety monitor" should be used as the means of fall protection.

"Control zone" means the area between an unguarded edge of a building or structure and a line which is set back a safe distance of **at least 2 m**.

Safety Monitor is a system in which a trained person is designated to monitor work activities in a Control Zone to ensure that work is done in a manner that minimises the potential for a fall.

The Control Zone method of fall protection is intended for level or low-sloped work surfaces. It shall not be used on a working surface where the slope of that surface exceeds 4 vertical in 12 horizontal, or for skeletal structure work or scaffold erection and removal.

If staff will at all times remain further from the unguarded edge than the width of the Control Zone, no Safety Monitor or other fall protection system need be used. For example, with a 2 m Control Zone the work shall be no closer than 2 m from the line of the Control Zone.

### 30.2 Working on Tank Roofs

Edge protection is required on the whole circumference of new and existing tanks. Refer to Edge Protection for additional requirements for roofs.

Provision shall be made for safe working on the tank beyond the normal working platform. In general tasks beyond those areas would be: inspect/repair roof cladding and/or inspect/repair air vents.

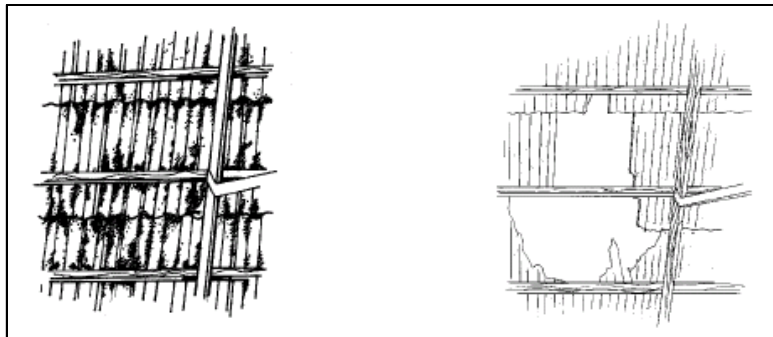
### 30.2.1 Tank Decking

The following shall apply:

- Where practicable tank roof work area decking and hatches shall be horizontal and have a non-slip surface e.g. checker plate or mesh
- Decking shall be provided on tank roofs near hatches to cover the normal work area
- The area of the decking shall be of sufficient size to be capable of containing an approved CSE tripod/davit radius and the required support personnel and shall be capable of accepting the loading for any works likely to be carried out from the deck including CSE

### 30.2.2 Brittle or Fragile Roofing

Brittle or fragile roofing materials include roofing made of asbestos, cellulose cement roof sheets, glass, fibreglass, acrylic similar synthetic moulded or fabricated material used to sheath a roof or in a roof are likely to endanger a person standing on them.



**Walking directly on fragile material is not permitted**

Fragile roofs shall be sign posted accordingly and are not to be walked on.

Where necessary, walkways shall be provided for safe passage over potentially brittle or fragile areas.

Where the work involves removal of a considerable amount of fragile material, the perimeter of the roof is not guarded by a solid balustrade, scaffolding or a guard rail that extends not less than **1 m or greater** above the roof level at the perimeter and includes a mid rail and toe board, or the roof is fragile or brittle, fall-arrest systems and devices shall be worn by all personnel engaged in the work to protect them from a fall.

Where a roof is to be accessed by staff/contractors for an integrity inspection, a planned inspection program should be established. This would normally be a SAP Planned Maintenance task.

Where a roof is found to be hazardous:

- The roof and access points are to be sign posted immediately
- Usual users are to be notified
- An Incident Report shall be prepared to include any short, medium and long term actions required



**Danger signs are to be fixed at points of access to the roof**

### **30.3 Working on Reservoir Roofs**

Roofs on reservoirs are generally a large area with a low slope from near ground level to up to 3m at the apex.

Where work on reservoir roofs is necessary, a risk assessment shall be conducted to assess the potential for injury and determine adequate control measures. Suitable control measures include:

- Temporary edge protection
- FIPS e.g. static lines with rope grabs
- Control zones

Considerations shall include:

- Slope of roof
- Distance to ground level
- Nature of the work
- Number of staff on roof
- Potential for damage to cladding



**Typical Reservoir Roof**



**Signage Applicable to a Control Zone**

Control zones shall be painted on all reservoir roofs.

### 31 Walkways and Platforms on Infrastructure

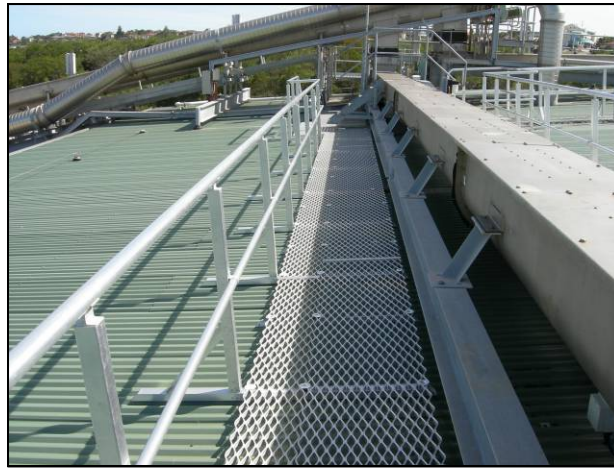
#### 31.1 General

Walkways and platforms (an area at which work or rest is carried out, which is elevated above the surrounding floor/ground level) shall be made of non-slip materials or have a non-slip treatment applied to them.

Walkways, access ways and working platforms are to comply with *AS 1657 Fixed Platforms, Walkways, Stairways and Ladders – Design, Construction*.

Surface treatment should be in accordance with:

- Water Corporation Floor Safety Requirements, OSH Branch Homepage, Hazard Treatment Documents
- *AS/NZS 3661.2:1994 Slip resistance of pedestrian surfaces – Guide to the reduction of slip hazards*
- *AS/NZS 4586:2004 Slip resistance classification of new pedestrian surface materials*



**Grid Mesh Flooring**

##### 31.1.1 Grid mesh and checker plate flooring checklist

- Flooring panels shall be securely fixed and assembled in accordance with manufacturer's specifications
- Where possible, they should be fitted to the structure, prior to it being lifted into permanent position
- Each panel shall be fixed securely before the next panel is placed in position
- During installation, this type of flooring should be secured by tack welding, panel grips or other means to prevent movement before being fixed permanently
- If panels of grid mesh or checker plate flooring are removed, and there is a risk of falling, edge protection shall be provided. Openings or holes shall be protected in accordance with *OSH Regulation 3.54*

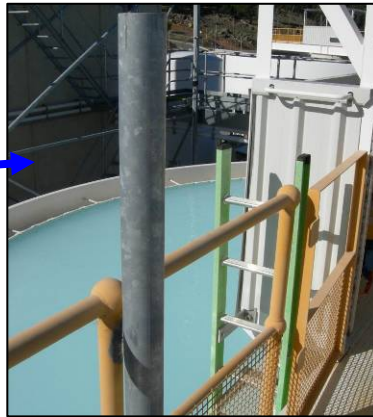
The dimensions of the mesh shall be that items such as tools, bolts and parts, normally associated with the work area, cannot fall through the mesh openings to a workplace below.

#### 31.2 Walkways on Clarifiers and Similar Structures

All new and existing clarifiers, sludge thickeners and similar infrastructure shall have a walkway to access launders for cleaning and other maintenance needs.

Note. The design and cost implications and the practicability to fit walkways to clarifiers are to be determined through a design review as part of the Prevention of Falls Implementation Program.

Walkway required  
around edge of clarifier



**Water Treatment Plant Clarifier**

### **32 Ducting and Drains**

All below ground duct channels and drains shall to be covered with mesh, checker plate or concrete lids. e.g. electrical cable duct in concrete floor, external below ground ducting, spoon drain, chemical pipe ducting or trench at treatment plant. Consideration should be given in selecting the optimum cover for trafficable areas considering minimal manual handling. e.g. Concrete is suitable for vehicle traffic but could be a manual handling hazard.

An exclusion zone with appropriate barricades shall apply when the covers are removed.

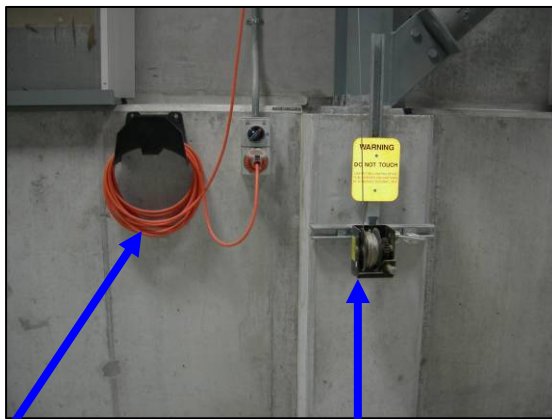
### **33 Lighting Fixtures in Pump Stations/Buildings**

Light fittings mounted on walls are to be positioned such that maintenance can be carried out from a fixed platform/decking including edge protection or floor level without the use of a portable ladder. Where fixed access is not practicable, an elevated work platform (EWP), step platform or mobile scaffolding shall be used.

Existing light fittings in the dry well part of pump stations and in elevated tank access columns shall be modified to conform to this requirement.

In new high roof/ceiling buildings such as large pump stations, treatment plant buildings and dam intake towers, where the optimum position for lighting is a ceiling height, the lighting shall be configured such that the light assembly can be lowered to the floor or a platform for maintenance.

One means of facilitating this is to have the light fitting attached to a rope and winch in order for the fitting to be lowered to ground level. The top pulley arrangement shall be of very high quality and maintenance free in order to reduce the likelihood of failure. Existing structures are to be modified where practicable. If not practicable, specific site procedures are required where EWP are to be used for maintenance purposes. Portable ladders are not to be used.



Extension cable

Winch



Fitting can be lowered to ground level

**Example of Retractable Overhead Lighting**

## 34 Dry Well Wastewater Pump Stations

### 34.1 General

In general, dry well wastewater pump stations are either covered ground level deck type or open deck. For the open deck type the pump/motor/valves and other components are withdrawn to ground level through a permanent opening at deck level, whereas in the covered ground level deck type, a section of the decking is removed to allow withdrawal of the equipment. Both normally have a pump station building above and some form of gantry to facilitate equipment removal.

### 34.2 Open Deck Pump Stations

Open deck pump stations shall have standard guardrail edge protection at the opening. In the situation where the components cannot be lifted over the guardrail a hinged or sliding section of the guardrail shall be provided. This shall be closed immediately after the item is at ground level and beyond the opening.

### 34.3 Covered Deck Pump Stations

A hinged grate (in most cases a two part grate) shall be permanently fitted below the deck cover in order to prevent a fall into the dry well when the deck cover is removed. The grate shall have an opening in the centre no greater than 200 mm x 200 mm in order to allow the lifting chain from the gantry to be lowered to the desired level below. The hinged grate is opened by the action of the item being lifted as it moves to ground level and beyond. Staff/contractors are to immediately close the hinged grate when the item is above ground level. A suitable rod or device will be required to close the grates.

The design of the hinged grate shall take into account the maximum width of any item to be removed from the dry well e.g. diameter of electric motor. Openings may need to be increased to provide for this falls prevention control measure. If modifications to the openings are not feasible, a portable barrier, to be secured to the decking, shall be provided.

### 34.4 Davit Mounting Bases – External to Building

A davit mounting base shall be provided at each opening to the wet well of a dry well pump station for CSE and rescue utilising a davit and winch.

### 34.5 Rescue Aids

The capability to rescue from the dry well part of the station shall be provided. In general, a davit mounting base, roof anchor point or other suitable point of attachment to accommodate a personnel rated winch for rescue would be fitted. A further arrangement is a roof mounted pulley with rope connected to a wall mounted winch.

For stations without a building over, the rescue plan could include the need for a portable tripod and not a fixed rescue aid.

**Note.** The design of anchor points, davit mounting bases or winch arrangements for inside the buildings of dry well pump stations is to be determined through a design review as part of the Prevention of Falls Implementation Program.



**Example of an Anchor Point and Chain for Winch Attachment**

## **35 Submersible Wastewater Pump Stations**

### **35.1 General**

All work in wastewater pump stations requires a risk assessment/JSA if the work instruction does not include prevention of falls.

All surfaces at ground level are to be non slip. e.g. access covers for level/alarm controllers

### **35.2 Prevention of Falls Control Measures**

The primary means of preventing a fall into an open wet well of a submersible wastewater pump station shall be a removable or hinged safety grate permanently positioned under the covers over the pumps.

An exception to this will be when permanent edge protection is installed which shall meet the following:

- comply with *AS/NZS 1657*
- be positioned directly against the open edge
- only have hinged lids in place
- enable the operator to open and close the lids without breaching the barrier

For a station with a removable safety grate/s, edge protection shall be erected before the grate/s is removed. The edge protection shall be between 900 mm and 1100 mm (guard rail height) above the wet well lid and fixed such that it cannot be dislodged.

For further details on edge protection please see section 17.1

Hinged and removable grates shall have at least one opening of no greater than 200 mm x 200 mm (or 200 mm diameter) for inspection of wash down purposes.



**Portable Guardrail System**

Removable grate is permanently resting under cover. Posts are inserted into brackets fixed under cover. Telescopic guardrails are assembled before grate is removed



**Foldaway Barrier**

Hinged barrier permanently fixed under cover



**Hinged Grate**

Hinged grate under cover

**35.3 Hinged Covers Over Wet Well**

Permanent edge protection (guardrail and toe board) may be fitted to hinged covered wet wells located within a perimeter security fenced site.

The guardrail shall include a self closing gate positioned for safe access to the ladder.

The edge protection shall be fitted as close as practicable to the edge of the openings. Only a person tethered for confined space entry shall proceed beyond the guard railing.

A winch for raising/lowering the covers can be attached to the guard rail.

A self closing lockable gate in the guard railing may be required for pump removal at close to ground level rather than over the guard rail. This gate could double as the ladder access gate.



**System for Hinged Covered Wet Well in Secured Submersible Pump Station Site**

**35.4 Davit Mounting Bases**

At least one davit mounting base shall be provided at the wet well of a submersible wastewater pump station for CSE and rescue utilising a davit and winch.

## 36 Tanks

### 36.1 General

This section applies to water tanks and similar structures with hatches.

Access to the hatch on the roof of a tank **below 3 m** high from ground level requires the minimum of an inclined fixed ladder.

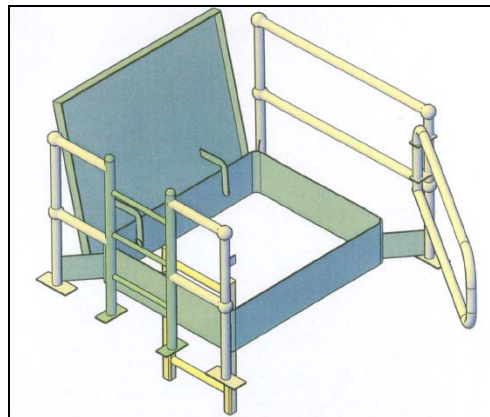
Refer to the Stairway section for access to tanks and similar structures.

### 36.2 Access to Tank Hatches

All new large ground tanks and elevated tanks where previous designs included a maintenance hatch and a personnel hatch shall have the two hatches located side by side and have a personnel rated fixed swivel davit located between the two hatches for equipment lifting below 200 kg and for rescue of personnel.

#### 36.2.1 Access Hatch

All new and existing tank hatches provided for personnel access to inside a tank or similar infrastructure shall be fitted with edge protection (guardrail and toe board) and a self closing gate as shown below.



**Personnel Hatch Design**

A toe board is not required if the hatch body finishes > 100 mm above the decking.

A hinged hatch lid can form one side of the edge protection if it rests, when open, in the vertical or near vertical position and the top edge is > 900 mm from the deck.

The gap between the ladder or ladder section fitted to the tank deck and the guardrail and toe board shall be between 60 mm and 150 mm.

#### 36.2.2 Equipment Hatch

All new and existing maintenance hatches (not a personnel access hatch) shall be fitted with edge protection (guardrail and toe board) and a self closing gate.

A toe board is not required if the hatch body finishes > 100 mm above the decking.

A hinged hatch lid can form one side (both sides if 2 lids) of the edge protection if it rests in the vertical or near vertical position and is > 1 m from the deck. The hatch lid open holding device shall be fitted.

If a davit or davit base is fitted, the guardrail should include a hinged lockable gate. The gate shall be locked when not in use.

#### 36.2.3 Ventilation Hatch

All new and existing ventilation hatches (not a personnel access hatch) shall be fitted with a secured safety grate, positioned below the hatch, and with apertures no greater than 200 mm x 200 mm.

#### 36.2.4 Control Hatch

All new and existing control hatches (not a personnel access hatch) shall be fitted with a removable safety grate, positioned below the hatch, and with apertures no greater than 200 mm x 200 mm.

#### 36.2.5 Existing Guardrails

Existing guardrails around tank deck could remain when hatch edge protection is fitted.

### 36.3 Working Inside Tanks

A permanent davit and winch arrangement shall be included for all tank designs that include an equipment hatch. The davit shall extend over the equipment hatch and be rated for a **minimum 200 kg** and also rated for the use of lifting a person. The winch shall be installed at a height above any opening (including open covers) that allows easy movement of an attached person such that that person does not interfere with the tank infrastructure when being moved from over the hatch opening or tank perimeter rail.

Provision for a portable davit and winch arrangement shall be included for all tank designs that do not include an equipment hatch. A permanent davit mounting base shall be fitted for this purpose. The davit shall extend over the hatch and be rated specifically for use for lifting a person. The winch shall be installed at a height above any opening (including open covers) that allows easy movement of an attached person such that that person does not interfere with the tank infrastructure when being moved from over the hatch opening or tank perimeter rail. An inwardly self closing lockable gate on the tank perimeter guardrail shall be included to minimise the height of the davit.

An internal vertical ladder rung ladder shall be included in the design. This ladder arrangement will be included into the design of the equipment hatch therefore there is no need for a separate access hatch (It will be included in the access hatch if an equipment hatch is not provided). It shall include one side platform at a distance of **2.5 m below the roof entry level for tanks > 6 m**. This platform is included for emergency rescue purposes and as a preparation location for divers and asset condition assessment personnel e.g. prior to entering water or a boat.

If an equipment hatch is not included in the design, the access hatch shall be of acceptable measurements for a fully equipped diver to enter without difficulty. The current hatch design of 1.1 m x 0.95 m is acceptable.

If an equipment hatch is included in the design, the hatch cover will be of two parts opening outwards to form a barrier from entry. Guardrails shall be installed on three sides of the hatch so that the first hatch cover opened becomes the fourth side barrier. A self closing gate for entry to the ladder area shall be included.

For all roof top tank entries, the person entering the tank shall be attached to the winch until they are at the point of entering the water or floating on a pontoon/boat.

A Job Safety Analysis shall be completed for all tank entries. This will include the mandatory requirement of having a davit and winch available and in place prior to all entries.

All entry to empty tanks will be through the provided side wall access hatch. If a side wall access hatch is not included in a design all tank entries shall be undertaken with the person tethered to the davit and winch.

For all tank entries including diving, the responsible operations group shall decide if it is to be a requirement to have a Water Corporation officer in attendance as a Responsible Person for ensuring compliance with all tank entry requirements. This decision shall be included in the detail of a Job Safety Analysis form.

All designs of tanks with a wall height measurement of **4 m or greater** shall provide for ground level side wall access.

## 37 Dam Intake Towers

It is accepted that there is a requirement for Corporation staff to operate, inspect and maintain equipment within dam intake towers.

The main reasons for entry into intake towers are:

- Tower hoist house
  - Operation of the crane and valves
  - Cleaning of the screens
  - Routine inspection
  - Annual dam safety inspection
  - Maintenance of the cranes
  - Replacing faulty lighting - use of EWP would be required in most circumstances
- Tower stem
  - Routine inspection of the valves, pipework and concrete structure (from weekly to monthly)
  - Annual dam safety inspection
  - Maintenance of the valves, actuators etc
  - Operation of the valves (at some sites the valves cannot be operated from the hoist house level)

Intake towers may have a depth of up to 50 m and are accessed via an internal staged ladder platform system or stairway.

New and existing intake towers shall have:

- A personnel rated overhead travelling crane used for rescue and inspection of the shaft
- A design registered work box with a gate for rescue from platforms
- Compliant edge protection where required as shown in the Edge Protection section

In addition all new intake towers shall:

- Be accessed via a stairway

In addition all existing intake towers shall:

- Have a ladder climbing system
- Provide for rescue from the ladder climbing system via a davit arrangement and personnel rated winch

## **38 Davit Systems**

### **38.1 General**

A davit system consists of a, davit mounted base or portable base and davit arm.

The davit base and supporting structure should be capable of withstanding a load of 15kN generated at the suspension point of a davit system.

Where a permanent davit is installed, the winch device shall be protected from the environment.

Davit mounted bases, davits and winches shall be included in a planned inspection program. This would normally be a SAP Planned Maintenance task. See Annex B to Appendix 4 Inspection of Equipment for inspection requirements for davits.

Permanent davit mounted bases may be the type to be bolted to a concrete floor (known as floor / surface mounted), side mounted or flush mounted in concrete. In general, the flush mounted type would be installed at new sites, whilst ensuring adequate winch clearance is available.



**Flush Mounted Base**

Portable davit arms with personnel rated winches would be fitted into the base and used for CSE or rescue purposes.



**Portable Davit in Flush Mounted Base**

All surface/floor mounted davit bases shall be prevented from becoming a tripping hazard by installing a removable, suitably painted bollard that can be locked in place once the davit base is no longer required.

### **38.2 Davit Mounted Bases at Tanks and Similar Structures**

All new and existing tanks and similar structures shall be fitted with a davit mounted base to accommodate a portable davit arm or shall be provided with a permanent davit for lifting of equipment from ground level to the top of a tank/structure, CSE and rescue purposes.

The davit arm and the base shall be positioned such that the operator is not hindered by any edge protection fitted to the perimeter of the tank or structure.

A self closing gate, to be padlocked when not in use, will generally be required on the edge protection in order to allow the load to enter and exit at deck level.

Provision shall be made for an appropriately sized exclusion zone in the area below the davit point (permanent or mounted only sites) at ground level or on a platform.

Where the fitting of a permanent davit or davit base is considered to be impracticable or not necessary based on:

- Structural ability of tank/structure to accept a davit
- General availability of cranes and elevated work platforms
- Access to the site for cranes/elevated work platforms
- Mobility time for cranes/elevated work platforms in an emergency
- Availability of trained/certificated cranes/elevated work platforms operators

- Cost of hire of cranes/elevated work platforms compared to frequency of use, cost of a permanent system and maintenance cost of a permanent system

A site procedure shall be established defining the means of moving equipment or people to/from ground level.

### 38.3 Davit Mounted Bases at Pump Stations and Treatment Plants

- Davit mounted bases shall be fitted at all new and existing:
  - Dry Well Wastewater pump stations
    - for each opening to the wet well, and
    - internal to pump station building for rescue purposes
  - Submersible Wastewater pump stations
  - Drainage pump stations
  - Medium and large Water Treatment Plants
  - Medium and large Wastewater Treatment Plants

### 38.4 Davit Mounted Bases at Pits

All new valve/pump/instrument equipment pits and other types assessed as necessary, shall be fitted with a davit mounted base. If a fixed guardrail is provided it shall have a lockable gate suitably located as part of the davit rescue capability.

## 39 Drainage Tasks

Where staff/contractors are required to work around drains (e.g. clearing drain structures of debris) a fall restraint system shall be used, where practicable, including a fixed post, fall arrest harness, karabiner, kernmantle rope and a rope grab.

The post shall only be installed at the top of the slope.



Anchor Post

Rope Grab

**Note.** A full body fall arrest harness shall be used for this application

## 40 Industrial Waste Pits

### 40.1 General

Industrial waste pits are located on commercial premises and require samples to be taken by competent staff/contractors in accordance with *Bylaws of the Water Supply Acts*.

These pits are either covered or uncovered. Covered pits may have either liftable lids or hinged covers.

It is acknowledged that the site and pits are not owned or controlled by the Water Corporation e.g. rear of restaurant, food processing factory.

The line manager responsible for waste sampling should negotiate with the owners of the pits to have the following barrier protection/safety grate fitted.

### 40.1.1 Uncovered Pits

All uncovered pits are to be fitted with edge protection in the area required for waste sampling.

### 40.1.2 Covered Pits

A removable or fixed safety grate shall be fitted with suitable openings for waste sampling (openings in the grate to be no greater than 200 x 200 mm) under the cover such that when the cover is removed a person is protected from a fall into the pit.

Where practicable, the cover shall be fitted with a hinged section for access for sampling. The concept being that the main cover need not be removed for the sampling procedure. The opening to be no greater than 200 x 200 mm or 200 mm diameter. The hinged cover arrangement is likely only to be suitable for a pit within a secured area such as a food processing factory.

## 40.2 Alternative Protection

### 40.2.1 Uncovered Pits

A ground anchor point should be fitted at Water Corporation cost and a fall arrest harness and fixed length lanyard/line provided to staff. The fixed line is not to allow staff to proceed beyond the edge of the pit.

A procedure shall be developed and appropriate training in the use of the equipment shall be provided.

### 40.2.2 Covered Pits

A portable grate shall be provided (openings in the grate to be no greater than 200 x 200 mm) at cost to the Water Corporation for insertion into the pit opening after the cover has been removed or hinged open.

Whilst it is recognised that the pit site may be a trafficable area, the pits are normally covered with an aluminium or concrete cover. The sampling procedure should require the placing of hazard cones to warn pedestrians and traffic that there is a hazard in the form of an open pit.

## 41 Access to Below Ground Structures

From time to time access to below ground structures such a clarifiers at wastewater treatment plants is required.

This Standard allows for the use of portable ladders for certain heights and under certain conditions. Therefore portable ladders could be used for access to below ground structures.

However in any JSA, a consideration for a control measure for safe access for below ground should include the use of a work box.

## 42 Excavations

Where excavations are carried out by Water Corporation staff/contractors control measures shall be employed to mitigate the risk of injury/fatality resulting from falling. This includes the risk of a fall by staff/contractors and the public.

An excavation can include a hole in the ground.

For low public risk sites, as a minimum, the area shall display warning signs and be delineated to ensure the public cannot enter the work site and identify the excavation to prevent workers from falling in. This could be done with barrier tape and or earth mounds. Fixed barriers shall be used if the excavation is to be open for more than one shift and is in a public access area, including that for private vehicles. Any barrier other than a fixed fence type barrier is only a visual aid to deter entry and should not be considered as preventing people from entering a site or excavation.

A fixed barrier shall be a fence of **minimum 900 mm high plastic mesh** such as “Artcraft Paraweb”. The fence shall be **supported by 10 mm diameter rope** secured at the top and bottom to **posts at 5m maximum spacing**. The fencing shall be secured by warning lamps in compliance with *AS 1742.3 Manual of uniform traffic control devices – Traffic control devices for works on roads*). Reflective tape shall be fixed to the plastic mesh.

If plastic mesh fencing is erected parallel and adjacent to traffic, separate delineation devices for traffic safety shall be provided at night in accordance with *AS 1742.3 Manual of uniform traffic control devices – Traffic control devices for works on roads* (cones, bollards as well as mesh). When fencing is dismantled temporarily to allow access by plant and workers, the excavation shall be delineated by cones/indicators at **minimum 2 m spacing** on all sides. If the work area is unattended, or the work ceases for the day, the fencing shall be re-established.

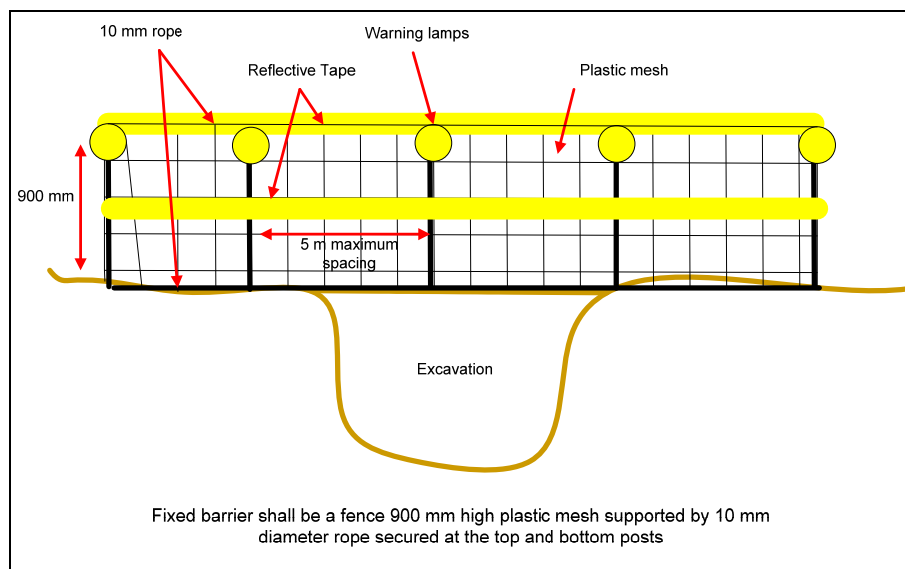
A chain mesh fence or hording may be required for long term barriers.

Warning signs shall be set up on the approach roads to the excavation, particularly where the work is not readily visible from a distance, and provide a temporary by-pass for vehicular traffic if necessary. It may also be necessary to arrange a traffic controller to warn and control traffic.

Access for pedestrians with direction signs around or over an excavation shall be established.

WC – OSH 129 Public Safety at Construction Sites specifies more stringent control measures for high public risk sites and for excavations deeper than 1m such as erecting a 1200 mm rigid frame fence.

Excavation work shall comply to WC - OSH 110 Excavation, WC - OSH 111 Traffic Management and WC – OSH 24G OSH Handbook for Construction Site Hazards.





For larger or deeper excavations it may be necessary to create a series of platforms by benching the sides of the trench so each vertical rise is a maximum of 1.5 m and the benches are a minimum of 1.5 m wide, or create a physical barrier by extending the shoring a minimum of 900 mm above the ground level.

Excavation work shall comply with the *WorkSafe WA Code of Practice – Excavation* and WC - OSH 110 Excavation.

Appropriate rescue aids shall be in place before excavation work commences.

### 43 Transportable Buildings

Plant, equipment and materials shall not be stored on the top of shipping containers and transportable buildings such as site offices, site boxes, site stores and lunch sheds. This requirement eliminates the need for a person to climb onto the building.

Eyes/lugs/hooks shall be fitted to the bottom of such buildings and shall be used to facilitate lifting in order to eliminate the hazard of a person climbing onto the roof to attach lifting aids. Spreader bars may be required for the lift.



**Example of a lifting lug at the bottom of a transportable building**

Where practicable, any cable to a transportable shall be below ground in order to eliminate a work at heights requirement for installation and a hazard for a crane, vehicle or carriage of items.

### 44 Trucks, Trailers, Commercial Vehicles and Plant Equipment

#### 44.1 General

Safe access shall be provided onto trays, cabs and work platforms of all trucks, commercial vehicles, trailers and plant equipment.

#### 44.2 Trucks and Plant Equipment

All trucks shall have a step aid constructed into the body of the truck to enable access and egress to and from the truck tray top. These include service trucks, water and sewer trucks, tipper trucks and tray top trucks with side gates, which range in capacity from 2 tonne to 20 tonne.

The design of the steps shall include the ability to achieve Three Points of Contact to aid in access to the truck tray. This would include handholds one or both sides of the steps for easy comfortable reach from ground level and a bottom step which shall be no more than 400 mm from the ground. Also, the location of the steps must always be on the passenger side of the vehicle.

These same specifications shall apply to the truck cab allowing the driver and passenger to enter and exit the cab via the same entrance i.e. facing the cab.

##### 44.2.1 Types of steps

Vertical step ladder type, with handholds on both sides (left and right)

Stairway constructed into the truck tray

Retractable steps fitted under the truck tray with either a hinge or slide out option



**Stairways**



**Retractable Steps**

### 44.3 Commercial Vehicles

The Land Cruiser, Nissan Patrol, Toyota Hilux tray top type vehicles, can utilise two types of steps. One option, is to fit a step to the towbar at the end of the vehicle, the second option is to fit a vertical step on the passenger side of the vehicle.



### 44.4 Safe Access on Vehicle Trays

Safe access shall be provided to any box or rack permanently mounted on the tray of a vehicle. This may include providing a non-slip surface on the top of any box.

### 44.5 Trailers

Trailers with wheel sizes of 14", 15" and 16" shall be accessed from the rear by opening the tail gate and stepping in.



Safe access shall be provided for trailer mounted boats.

## 45 Fall Injury Prevention Systems (FIPS) for Use in the Water Corporation

The detailed criteria for the application, use and management of FIPS is at Appendix 4.

A guide to the types of FIPS to be used in the Water Corporation is at Annex A to Appendix 4.

A checklist and inspection for FIPS is at Annex B to Appendix 4.

Following a fall, hard FIPS such as fall-arrestors and anchor points shall be withdrawn from service and re-certified by the manufacturer or designer of the product.

Following a fall, soft FIPS such as harness and lanyards shall be removed from service and destroyed.

### 46 Rescue Planning

It is necessary to define strategies required to ensure the safe and controlled evacuation of personnel in the event of a fall or emergency situation.

All workplaces where there is a potential for a fall from **3 m or greater** are to have a Rescue Plan to cover events where a person cannot, themselves, return to ground level.

All relevant staff shall be trained in the Rescue Plan.

Rescue plans should identify the medical considerations unique to casualties experiencing suspension trauma and mitigate the risk of suspension trauma occurring. Suspension trauma is a condition (e.g. following a fall), whereby a person suspended in a harness in a substantially upright position may experience blood pooling in the legs.

A Guide to Rescue Planning for Working at Heights is at Appendix 6.

### 47 Signage

The *Site Security, Public Safety and OSH Signage Standard S 197* includes signage applicable to potential for falls situations and working at heights.

As a minimum “Safety Harness Must Be Worn” and “No Climbing” signs are required in appropriate locations and “No Step” signs on removable safety grates.

### 48 Secure Locking System

The Water Corporation’s secure locking system, BiLock, shall be used and the appropriate key control measures are to be in place for areas where there is a risk of a fall.

### 49 Decommissioned Structures

Decommissioned structures or parts thereof that no longer require access for normal operations and where there is a potential for falls, shall be appropriately signposted and deterrent barricading erected.

The integrity of the barricading and condition of the signage shall be checked as part of a planned inspection program. This would normally be a SAP Planned Maintenance task.

### 50 Other Working at Heights Situations

This Standard does not cover all specific working at heights situations within the Water Corporation. Advice on control measures for the following or other working at height activities should be sought from Manager OSH.

- Gauging weir readings
  - Accessing earth dam walls
  - Inspections of dam intake tower bridges
- Edge protection on drainage structures

Document Revision History	
10 August 2007	First issue
8 April 2008	Section 13 revised
10 March 2009	Major revision
7 July 2010	Major revision including clarification for ease of understanding