

STD-SPE-G-008
TECHNICAL SPECIFICATION
DESIGN REQUIREMENTS FOR SAFE ACCESS, EGRESS
AND WORKING AT HEIGHTS





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Document applicability table

Asset area	Applicable (Yes/No)	Asset area	Applicable (Yes/No)
Dams (DAM)	Yes	Water Network (WAT)	Yes
Bulk Water Supply (BWS)	Yes	Sewerage Network (SEW)	Yes
Water Treatment Plants (WTP)	Yes	Sewage Pump Stations (SPS)	Yes
Water Pump Stations (WPS)	Yes	Sewage Treatment Plants (STP)	Yes
Reservoirs (RES)	Yes	Recycled Water Systems (REC)	Yes

Table of Contents

Abbreviations	i
Definitions	ii
1 Background	1
2 Scope	1
3 Purpose	1
4 Referenced documents	2
5 General design requirements	3
5.1 Safety-in-design	3
5.2 Selection of equipment and/or means of access	3
5.3 Applying the hierarchy of controls	4
5.4 Asset design life	5
5.5 Human factors	5
5.5.1 Fitness for work	5
5.5.2 Hazardous manual tasks	5
5.5.3 Ergonomics	6
5.6 Worker emergency response plans	6
5.7 Portable limited free fall-arrest systems	6
5.7.1 Background	6
5.7.2 Limited free-fall arrest requirements	6
5.7.3 Portable Tripods	7
5.7.4 Portable davits	7
5.8 Portable edge protection systems	14
5.9 Portable ladders and other portable/mobile fall prevention devices	14
5.9.1 Portable ladders	14
5.9.2 Other portable/mobile fall prevention devices	14
5.10 Work positioning systems	14
5.11 Fixed single-point anchor devices for personal fall arrest or restraint	15
5.12 Signage and certification plates	15
5.13 Trip and slip hazards	16
5.13.1 Public footpaths, designated access zones and walkways	16
5.13.2 Other areas	17
5.13.3 Edge bevelling – Walkways, access zones, platforms and public footpaths	18
5.14 Fixed platforms, walkways, stairways and ladders	18
5.15 Access hatches and access covers	19
5.15.1 General	19
5.15.2 Design principles and generic requirements	19
5.16 Doors and other openings	25
APPENDIX A – TECHNICAL SPECIFICATION UPDATE HISTORY	26
APPENDIX B – SPECIFIC AND GENERIC GUIDANCE FOR WORKING SAFELY AT HEIGHTS	27

Abbreviations

ACT	Australian Capital Territory
AS, AS/NZS	Australian standard; joint Australian and New Zealand standard
ALARP	As low as reasonably practicable
c/w	complete with
HDG	Hot-dip galvanized
NCC	National Construction Code
SiD	Safety in design
SRL	Self-retracting lanyard
WAE	Work as executed

Definitions

Access zone	Refer to Icon Water specification STD-SPE-G-009 for this definition.
Confined space	Shall be as defined in AS 2865.
Emergency response plan	With specific regard to access, egress and working at heights, an emergency response plan is a sequence of steps taken, in conjunction with the appropriate equipment, that will allow a worker to egress or be removed from an unsafe situation with or without assistance of co-workers who may or may not be located within the same unsafe environment.
Fall distance	Refer to Icon Water specification STD-SPE-G-009 for this definition.
Fall potential	Refer to Icon Water specification STD-SPE-G-009 for this definition.
Flush-fit	Refer to Icon Water specification STD-SPE-G-009 for this definition.
Landing	Refer to Icon Water specification STD-SPE-G-009 for this definition.
Hazardous manual tasks	The lifting, supporting or moving of a load by the human body without the assistance of any other means such as mechanical, electrical or hydraulic tools, equipment or machinery.
Low headroom	Any access zone, walkway or platform which has a vertical clearance greater than 1700 mm but less than 2000 mm from the top of the walking surface to the underside of any obstruction (e.g. roof support beam).
Manual handling	Refer to “hazardous manual tasks”.
Portable davit	A completely portable davit arrangement including tow-bar mounted davits, barrier mounted davits, “H-based” davits and clamp-on davits.
Shall	Indicates a mandatory requirement.
Should	Indicates a recommended or preferential requirement
Walkway	Refer to Icon Water specification STD-SPE-G-009 for this definition.
Worker	Indicates an Icon Water employee or a contractor to Icon Water, or a person who has authority to enter an Icon Water controlled site for inspection and maintenance purposes.
Working at height	Any situation where a worker has the potential to fall from one level to another.
WorkSafe	Refers to WorkSafe ACT but also implies WorkCover NSW and SafeWork Australia as applicable. WorkSafe ACT is the ACT government entity which has the role of enforcing the health and safety and workers compensation laws within the ACT.

1 Background

In late 2016 Icon Water embarked on the process of developing a set of prescriptive design requirements for safe worker access, egress and working at heights within its water and sewerage networks and facilities. Prior to this time, the requirements were determined on a project-by-project basis using performance-based requirements and a limited number of standard drawings.

The previous use of project-by-project performance-based requirements has led to a lack of standardisation with ladders, access hatches, covers and guardrailing systems. This lack of standardisation makes worker safety harder to manage and also leads to higher project costs and longer project delivery periods.

Icon Water's prescriptive requirements, as detailed in this and other specification documents, have been developed following a risk-based approach which considered the concept of "reasonably practicable" within the work environment.

2 Scope

This specification:

- a) Shall apply to the design of new equipment and structures, as well as designs relating to existing equipment and structure upgrades, where the location will be within the asset areas shown in the Document Applicability Table. Note: This table is located in the section immediately prior to the table of contents.
- b) Must be fully complied with by designers.
- c) Must be read and applied in-conjunction with the documents listed in Table 4.1.

3 Purpose

The purpose of this specification is to provide:

- a) Prescriptive design requirements for safe worker access, egress and working at heights. These design requirements relate to items such as, but not limited to: trip hazards, ladders, access hatches, access covers, guardrailing, walkways and access zones.
- b) Guidance information relating to Icon Water's approved and/or preferred equipment features (e.g. limited free fall arrest equipment) so that external designers such as engineering consultants, can make valid assumptions regarding how various assets are to be accessed, egressed, operated and maintained by workers.
- c) Guidance information relating to Icon Water's potential worker emergency response plans for various asset types if a worker rescue sequence (e.g. confined spaces) is to be enacted by Icon Water staff.

4 Referenced documents

The documents listed in Table 4.1 are either referenced by this specification, and/or shall be read in-conjunction with this specification. Note: The most current edition shall apply.

Table 4.1 Referenced documents

Item	Document number	Title
Australian standards		
1	AS 1318	SAA Industrial safety colour code
2	AS 1319	Safety signs for the occupational environment
3	AS 1657	Fixed platforms, walkways, stairways and ladders – Design, construction and installation
4	AS/NZS 1891.4	Industrial fall-arrest systems and devices – Selection, use and maintenance
5	AS/NZS 1892.5	Portable ladders – Selection, safe use and care
6	AS 2700	Colour standards for general purposes
7	AS 2865	Confined spaces
8	AS/NZS 5532	Manufacturing requirements for single-point anchor device for harness-based work at height
SafeWork Australia (and WorkSafe ACT) codes of practice		
9	Not assigned	Confined spaces
10	Not assigned	Managing the risk of falls at workplaces
11	Not assigned	Safe design of structures
12	Not assigned	Hazardous manual tasks
WSAA codes and publications		
13	WSA 201	Manual for the selection and application of protective coatings
Icon Water standards and work instructions		
14	STD-SPE-G-005	Supplement to WSA 201 Manual for the selection and application of protective coatings
15	STD-SPE-G-006	Approved Products List
16	STD-SPE-G-009	Supplement to AS 1657 Fixed platforms, walkways, stairways and ladders – Design, construction and installation
17	PRO2.09	Confined space procedure
18	WI07.01.01	Risk assessment tables
19	WI02.09.01	Confined space work instruction
20	EN02.09.01	Confined space egress planning enabler
21	EN02.00.03	Ladder safety enabler

5 General design requirements

5.1 Safety-in-design

All new equipment, installations and supporting structures etc. shall be designed to be in accordance with the relevant WHS act and regulation. This shall be achieved by due reference to the relevant WorkSafe code of practice (e.g. *Safe design of structures*).

Designers shall demonstrate that reasonably practicable steps have been taken to eliminate hazards, or if not practicable to eliminate, then to minimise the risk of hazards to an ALARP level which could affect the health and safety of those who may be affected by the designed equipment and structures throughout the full asset lifecycle (i.e. fabrication, construction, transport, testing, commissioning, operation, maintenance and demolition etc.)

Designers are obliged to indicate all hazards inherent in their design for the full asset lifecycle and to pass on this information in a design report. The design report shall, as a minimum, provide a hazard and risk register which:

- a) Lists all of the hazards inherent in the design for the full asset lifecycle (i.e. not just for construction activities).
- b) Lists the mitigation measures required and level of risk before and after the mitigation measures are applied for each hazard.

Generic, templated hazard and risk registers are only acceptable when producing designs which will be included as part of Icon Water's suite of design infrastructure standards. This is due to the fact that such standard designs will be compulsorily reviewed as part of the SiD process when they are used as part of a specific project. Otherwise, all hazard and risk registers which relate to a specific asset at a specific site must be specific to that asset type and location unless written approval is obtained from the relevant Icon Water Principal Engineer. Approval may be granted if it can be demonstrated that the asset design is sufficiently similar to an existing, well-proven design, or if the design is part of a "batch" of sufficiently similar sites and designs which can be analysed together.

The designer shall ensure that they consult directly with the workers (or their immediate supervisors) who will be operating and maintaining the new or upgraded asset. Icon Water has an obligation to the designer (if the designer is an external engineering services provider) to make sure that the designer has access to such workers (e.g. through the facilitation of design reviews, SiD workshops and site inspections). The designer shall familiarise themselves with the operational and maintenance requirements of the asset.

5.2 Selection of equipment and/or means of access

In general, designers should consult the specific, prescriptive requirements listed in Appendix B as well as Icon Water specification STD-SPE-G-009 and the Icon Water "SD Series" standard drawing set in the first instance for specific selection requirements regarding equipment and/or means of access and egress. However, if these documents are "silent" with regards to a specific application or asset type, the designer shall select/specify access equipment and/or an access/egress method based on the hierarchy shown in Table 5.2.1 where "Level 1" is most preferred and "Level 5" is least preferred. For example, the designer shall specify "Level 1" – access at ground level but if this is not achievable then the designer should specify "Level 2" – access using stairways etc.

Table 5.2.1 Hierarchy of Access/Egress Equipment and Methods

Level	Equipment or Method
1	Access at ground level up to a slope of 20°.
2	Access using stairways between an angle of 20° to 45°.
3	Inclined step ladders at an angle between 60° and 70°.
4	Inclined twin-style rung ladders at an angle between 70° and 85°.
5	Inclined twin-style rung ladders at an angle between 85° and vertical.

Note: Step-irons may only be used where specifically detailed in Icon Water’s suite of standard drawings.

5.3 Applying the hierarchy of controls

The specific guardrailing, ladder, ramp, fall arrest and restraint system requirements specified in this document and elsewhere in Icon Water’s suite of design standards are based on the well known concept of the “hierarchy of controls”. Should Icon Water’s suite of design standards be “silent” with regards to a particular control measure which will prevent a fall from height, then the designer shall design in accordance with the hierarchy of controls detailed in Table 5.3.1. It should be noted that “Level 1” is the most preferred method and “Level 6” is the least preferred.

Table 5.3.1 The hierarchy of controls

Level	Method
1	Elimination of the hazard by providing access from the ground or a level platform with a perimeter guardrail.
2	Providing passive fall protection equipment using permanent perimeter guardrailing.
3	Providing fall restraint equipment consisting of a continuous rail system.
4	Providing fall restraint equipment consisting of a continuous static line system.
5	Providing limited free fall arrest equipment consisting of single anchorage points where the users are required to attach and unattach from the different anchor points.
6	Providing ladders (to work from) or systems of work that are largely dependent upon training and workers doing “the right thing”.

Note: Designers shall provide specific user instructions as well as emergency rescue plans for Level 5 and Level 6 systems when requested by Icon Water through a specialist SiD (e.g. CHAIR) workshop.

5.4 Asset design life

All permanently installed equipment, structures, mechanisms and ancillary items that are required for providing safe worker access and egress, or are required to allow a worker to traverse between levels within or on a structure shall have a design life of 50 years with the exception of:

- a) Fixed ladders and step irons located within environments deemed to be “High” or “Immersion” in accordance with Table 2.1 of *WSA 201 Manual for the selection and application of protective coatings*. In such environments, the design life shall be 25 years.
- b) Access hatches located on the roof of tanks and reservoirs. The design life shall be equal to that of the roofing material.
- c) Permanently installed davit bases and other permanently fixed items which form part of a fall-arrest system. The design life shall be 10 years.

5.5 Human factors

5.5.1 Fitness for work

Designers shall assume that for work defined as “high risk” (in accordance with the relevant WHS legislation) only Icon Water workers who are appropriately trained and physically and mentally fit to perform such work will be utilised. “High risk” work includes, but is not limited to, working at heights or in confined spaces.

Designers shall assume that only Icon Water workers who have been appropriately trained and are physically capable of manually lifting the loads detailed in Section 5.5.2 will be required to do so.

5.5.2 Hazardous manual tasks

Table 5.3.2.1 details the mass limits for hazardous manual tasks (aka “manual handling”) for various items relevant to worker access, egress and working at heights. The designer shall comply with these limits and design appropriately.

Table 5.5.2.1 Hazardous manual tasks - Mass limits

No.	Item	Maximum mass (kg)	Notes
1	Sewer maintenance hole access covers	Refer to Notes	Lifting devices are to be employed for trafficable covers
2	Trafficable personnel access covers	Refer to Notes	Lifting devices are to be employed for trafficable covers
3	Access hatch or cover – 1 person lift	20 kg	At least one handle is required if the mass is greater than 10 kg. A hand slot (or slots) can be used if the mass is less than or equal to 10 kg.
4	Access hatch or cover – 2 person lift	32 kg	At least two handles are required if the mass is greater than 20 kg.
5	All other items requiring manual handling for access, egress or working at heights purposes	Refer to Notes	The maximum mass shall be determined by the shape and size of the object. Subject to a risk assessment indicating a higher mass can be manually handled, 25 kg shall be the maximum.

5.5.3 Ergonomics

The designer shall incorporate ergonomic principles into the design of elements required for safe worker access, egress and working at heights.

The designer shall utilise the latest human factors data published by the Australian Bureau of Statistics as well as up-to-date data from reputable, peer-reviewed sources.

Designers shall assume that an Icon Water worker has a maximum mass (including tools and equipment) of 120 kg for ladders as well as surfaces and structures which:

- May be walked upon, and
- are not part of a designated access zone or walkway, and
- are required, out of necessity, to have a load rating which is lower than the surrounding platform, access zone or walkway.

5.6 Worker emergency response plans

The designer shall ensure that any design element forming part of a safe worker access, egress or working at heights system will not impact negatively on worker emergency response plans.

The designer shall take into account the approved range of limited free-fall arrest equipment, as detailed in the Icon Water document titled *STD-SPE-G-006 Approved products list* when assessing whether a design element will impact negatively on worker emergency response plans.

The review of the proposed worker emergency response plan shall be included as part of the SiD review process which the designer shall be required to take part in.

5.7 Portable limited free fall-arrest systems

5.7.1 Background

Icon Water maintenance teams carry portable davit systems and/or tripods on their maintenance vehicles so that they can be deployed when required for performing inspection and maintenance activities on/within water and sewerage network and facilities assets. Davits or tripods are used as part of limited free-fall arrest systems.

Note: "Limited free-fall arrest" shall be treated as a category of "fall arrest" systems when interpreting this specification.

Icon Water specify that only Type 3 self-retracting lanyards (SRLs) shall be used in conjunction with a davit or tripod system. Furthermore, Icon Water only approves Type 3 SRLs which provide an arrest force no greater than 4 kN onto the wearer of a full body harness. This requirement is more stringent than that of AS/NZS 1891.4 which specifies a maximum arrest force of 6 kN. The designer shall refer to the Icon Water document titled *STD-SPE-G-006 Approved products list* when determining which fall-arrest systems may be required when accessing the asset for maintenance purposes.

5.7.2 Limited free-fall arrest requirements

The designer shall take into account the Icon Water requirement that when either a tripod or davit is to be used, it shall form part of a limited free-fall arrest system as defined in AS/NZS 1891.4.

Icon Water's requirements for limited free fall-arrest systems are as follows:

- a) An approved full body harness must be worn by the worker. Lower body harnesses are not acceptable.
- b) If chemical or friction anchor systems are used as part of a fixed limited free-fall arrest device (e.g. fixed davit bases) then the chemical anchor system shall be suitable for shock loads.

- c) If chemical or friction anchor systems are used as part of a single point anchorage, they shall be designed to be in shear and not in tension. Where anchorages are to be used in tension, then they shall be cast into concrete at the time of pouring or they shall be of the bolt-through type. Refer to Fig. 5.7.2.1 for details.
- d) A shock-absorbing lanyard **shall not** be used in-conjunction with a self-retracting lanyard (SRL) due to the potential increase in fall distance. Only a Type 3 SRL which limits the free fall distance to less than 600 mm shall be used and it shall be directly attached between the user's harness and to the anchor point on the davit arm.

Note 1: The Type 3 SRL allows for limited free fall as well as winching capability in the event that the user is required to be hoisted to safety.

Note 2: The "Maximum Arrest Distance" should not be confused with the "Free Fall Arrest Distance". Refer to the AS/NZS 1891 series of standards for specific definitions.

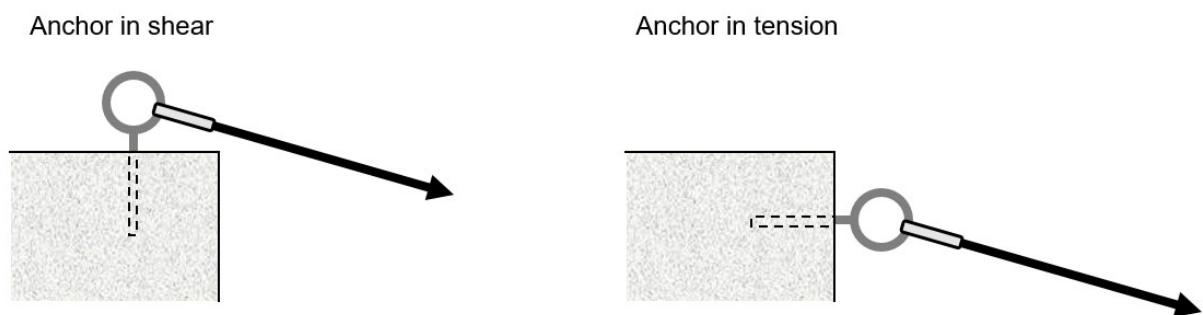


Fig. 5.7.2.1 Single point anchorages – shear and tension defined

5.7.3 Portable Tripods

The designer shall assume that any portable tripod used by Icon Water as part of a portable limited free-fall arrest system fully complies with the requirements of AS/NZS 1891.4 and AS/NZS 5532.

The structure that the portable tripod is to be located on shall be designed based on the assumption that 15 kN is applied to the tripod anchor point regardless of whether or not a limited free-fall arrest system (which limits the arrest force to 4 kN) is employed. If this is not practicable, then a 12 kN anchor point load shall be assumed.

5.7.4 Portable davits

5.7.4.1 General

The portable davits used by Icon Water maintenance personnel can be setup using either permanently fixed davit bases or completely portable arrangements (e.g. tow bar mounted davits, barrier mounted davits, "H-based" davits or clamp-on davits).

Wherever practicable, and unless detailed otherwise by the specific requirements of Section 6 of this specification, the designer shall base their design on the use of completely portable davit arrangements (i.e. no permanently fixed davit base). The specification of completely portable davit arrangements allows for more efficient inspection and testing of davit systems, increases worker safety outcomes due to having equipment regularly visible, and reduces the compliance burden due to testing and inspection of fixed davit bases that may be only used once every few years.

5.7.4.2 Tow-bar mounted davits

If tow-bar (aka “hitch”) mounted davits are determined to be the most practicable in a particular design application, then the designer shall ensure that any vehicle within the Icon Water maintenance team’s fleet of light vehicles (e.g. Toyota Hilux or Ford Ranger etc.) can safely be reversed sufficiently close to the application area for deployment of the davit-based limited free fall arrest system. The designer shall consider issues such as but not limited to turning circle, lack of visibility, unevenness of ground, excessive cross-fall, excessive slope, edge protection, allowance for stretcher access alongside the vehicle and “locking off” the vehicle during davit deployment etc.



Fig. 5.7.4.2.1 A tow-bar mounted davit being set-up over a maintenance hole

5.7.4.3 Portable barriers with integrated davits

If portable barriers with integrated davits are determined to be the most practicable in a particular design application, then the designer shall ensure that there is sufficient footprint available for the portable barriers listed in the Icon Water document titled *STD-SPE-G-006 Approved products list* to be used safely. The designer shall consider issues such as but not limited to unevenness of ground, maximum access hatch size, excessive slope, clearance to the edge of an open access hatch, stability issues requiring the use of an addition barrier stabiliser (and hence extra barrier footprint) and the loading applied to the davit base.



Fig. 5.7.4.3.1 Portable barrier with integrates davit
(Image courtesy of SpanSet Australia Ltd)

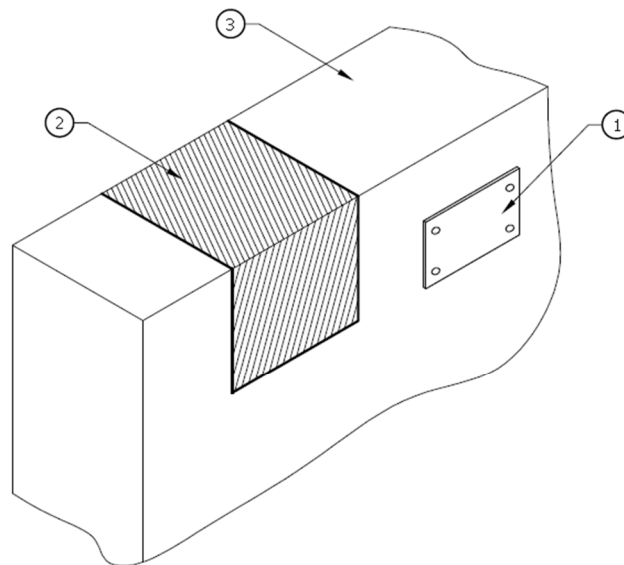
5.7.4.4 Clamp-on davit bases

Clamp-on style davit bases are not acceptable for use with new assets and are not preferred for use where upgrades to existing assets are required unless no other option is achievable. They shall not be specified as part of an emergency response plan or limited free-fall arrest system without the written approval of the relevant Icon Water Principal Engineer. If a clamp-on davit base is to be used on a structure such as a parapet wall, then prior to the first use, the location to be used for clamping shall meet the following requirements:

- a) It shall be clearly marked with a black (N61 to AS 2700) painted rectangle, hatched at 45° with a line width no less than 25 mm.
- b) The location shall be inspected by an engineer who holds either chartered status (CPEng) with Engineers Australia, or registered professional status (RPEng) with Professionals Australia, and has the appropriate experience and competence to assess the integrity of a building or structure and anchor points.
- c) Based on the inspection, and any other relevant information such as the provision of certified WAE drawings, the engineer shall provide written certification that all combinations of loads in a worst case situation can be safely contained by the proposed structure at the nominated location.
- d) A certification plate shall be provided with the details, and at a location, complying with AS/NZS 1891.4 and the engineer's approval. Refer to the Icon Water suite of standard ("SD series") drawings for an approved certification plate design.



Fig. 5.7.4.4.1 A clamp-on type davit
(Image courtesy of SpanSet Australia Ltd)



- NOTES:
1. CERTIFICATION PLATE.
 2. DESIGNATED CLAMPING ZONE FOR DAVIT BASE.
 3. PARAPET WALL (OR SIMILAR).

Fig. 5.7.4.4.2 An example of a davit clamping zone on a parapet wall

5.7.4.5 Davits with “H-bases”

“H-bases (aka “three-piece bases” and “five-piece bases”) are bulky items which require an extended setup time compared to other types of portable davit bases and are therefore not preferred if other portable options are available. The designer shall ensure that there is sufficient footprint available for the “H-bases” listed in the Icon Water document titled *STD-SPE-G-006 Approved products list* to be used safely. The designer shall consider issues such as but not limited to unevenness of ground, maximum access hatch size, excessive slope, clearance to the edge of an open access hatch, stability issues, edge protection and the distance required to be traversed when carrying the davit and base components.



Fig. 5.7.4.5.1 A portable “H-base” davit
(Image courtesy of SpanSet Australia Ltd)

5.7.4.6 Fixed davit bases

Fixed davit bases and their hold-down bolts, nuts, washers and backing plates (as applicable) shall be constructed of either galvanised mild steel for environments deemed to be “Low” or “Moderate”, or stainless steel (minimum grade 316) for environments deemed to be “High” or “Immersion” (ref: Table 2.1 of *WSA 201 Manual for the selection and application of protective coatings*).

If fixed davit bases are determined to be the most practicable in a particular design application, the designer shall select the type of fixed davit base based on the hierarchy shown in Table 5.7.4.6 where “Level 1” is most preferred and “Level 4” is least preferred.

Table 5.7.4.6 Hierarchy of Fixed Davit Bases

Level	Type of Fixed Davit Base	Notes
1	Core mounted sleeves	Preferred as this type of davit does not require hold-down bolts and therefore does not require bolt pull-out testing.
2	Bolt-through	Preferred as bolt pull-out testing not required as part of routine inspection. This type of davit is not preferred where the backing plate would be located in a corrosive environment such as inside a sewer tank or in contact with the ground.
3	Bolt-on (bolts accessible without entering buried structure)	Bolts shall be easily accessible for pull-out testing.
4	Bolt-on (bolts not easily accessible)	Approval from the relevant Principal Engineer is required for bolt-on davits that require entry into the buried structure and/or scaffolding to access the hold-down bolts for testing.

If bolt-on davit bases are determined to be the most practicable in a particular design application, then the designer shall consider that stainless steel hold-down bolts and nuts may gall upon assembly or disassembly rendering them unfit for future service. When stainless steel hold-down bolts and nuts are used, the designer shall specify that the threaded section of the bolt shall protrude a length D to $1.5D$ above the nut (where D is the nominal bolt diameter) so that future bolt pull-out testing can be conducted with the davit base insitu.

The structure that the fixed davit base is to be located on shall be designed based on the following assumptions:

- a) A 15 kN davit anchor point load is applied at the davit anchor point regardless of whether or not a limited free-fall arrest system (which limits the arrest force to 4 kN) is employed. If this is not practicable, then a 12 kN anchor point load shall be assumed.
- b) The maximum reach of the davit arm is limited to 1100 mm.
- c) The maximum height of the davit anchor point (above the underside of a bolt-on/through davit base) is limited to 2527 mm.

Refer to Fig. 5.7.4.6.2 for details.

Prior to first use, fixed davit bases require written certification by an engineer who holds either chartered status (CPEng) with Engineers Australia, or registered professional status (RPEng) with Professionals Australia, and has the appropriate experience and competence to assess the integrity of a building or structure and anchor points. The written certification shall state that all combinations of loads in a worst case situation can be safely contained by the proposed structure at the nominated location.

A certification plate shall be provided with the details, and at a location, complying with AS/NZS 1891.4 and the engineer's approval. Refer to the Icon Water suite of standard ("SD series") drawings for an approved certification plate design.

The designer shall assume that all future inspection and testing (if required) of fixed davit bases shall be in accordance with AS/NZS 1891.4.

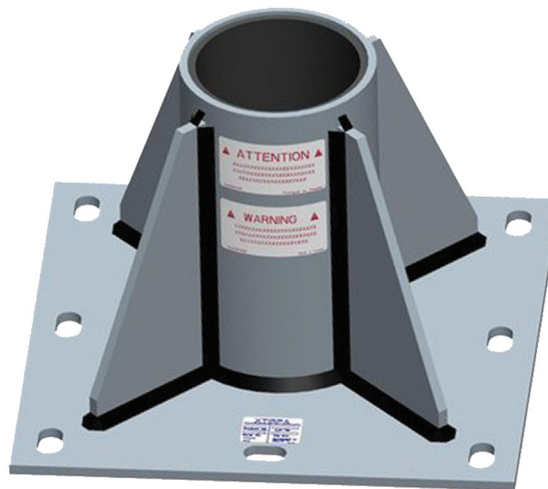
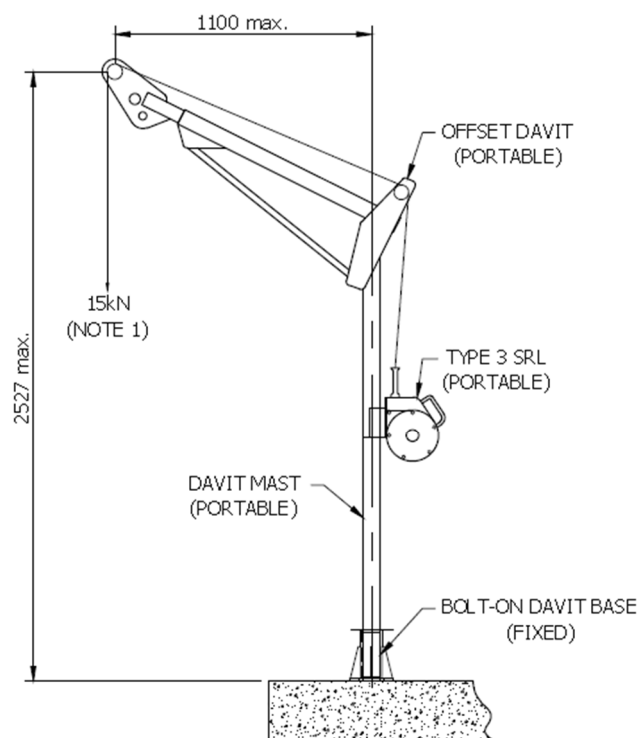


Fig. 5.7.4.6.1 A bolt-on (or bolt-through) fixed davit base
(Note: Only stainless steel or galvanised mild steel bases are to be installed)
(Image courtesy of SpanSet Australia Ltd)



NOTE 1: IF 15kN IS NOT PRACTICABLE, AN ANCHOR POINT LOAD OF 12kN SHALL BE USED FOR DESIGN PURPOSES

Fig. 5.7.4.6.2 Fixed davit base – assumptions for the design of the supporting structure

5.8 Portable edge protection systems

From May 2017, Icon Water maintenance teams have approval to employ the use of portable barriers which can be used with or without an integrated davit. These barriers are available in two specific sizes (ref: Icon Water document titled *STD-SPE-G-006 Approved products list*). The designer shall, wherever practicable, design in such a way that alternative edge protection systems do not have to be hired or purchased for anything other than inspection and maintenance activities that are scheduled on a once every five years or more basis.

Portable edge protection systems that require permanent fixings (e.g. Kennedy “Railsafe” systems) shall not be specified by designers unless (i) the asset is a sewage pump station and permanent guardrailing cannot be installed due to rejection by the relevant ACT government entity, or (ii) written approval is obtained from the relevant Icon Water Principal Engineer.

5.9 Portable ladders and other portable/mobile fall prevention devices

5.9.1 Portable ladders

Designers shall only specify the use of portable ladders as a primary means of access, egress or working at heights when it is not reasonably practicable to follow the hierarchy of controls as detailed in Section 5.3. Should a portable ladder be specified by a designer as a means of providing access/egress then it shall fully comply with the requirements of AS/NZS 1892 and the SafeWork Australia code of practice titled *Managing the risk of falls at workplaces*.

5.9.2 Other portable/mobile fall prevention devices

“Other portable/mobile fall prevention devices” include, but are not limited to:

- a) Temporary work platforms
- b) Scaffolding
- c) Elevated work platforms
- d) Crane-lifted personnel boxes and workboxes
- e) Forklift work platforms

Wherever possible, the designer should, if any of the above-listed portable/mobile fall prevention devices are required to be used for inspection and maintenance purposes, design in such a way that they do not have to be hired or purchased for anything other than inspection and maintenance activities that are scheduled on a once every five years or more basis.

With the exception of crane-lifted personnel boxes for sewage pump station wet well maintenance, the designer shall ensure that these devices are not required as part of a worker response plan for routine inspection and maintenance activities which are carried once or more per annum.

5.10 Work positioning systems

Work positioning systems include, but are not limited to:

- a) Industrial rope access systems
- b) Restraint systems
- c) Pole straps
- d) Bosun’s chairs

With the exception of scheduled sewer maintenance hole and sewage pump station wet well inspection and maintenance activities, the designer shall ensure that industrial rope access systems and bosun’s

chairs are not required to be used for anything other than inspection and maintenance activities that are scheduled on a once every five years or more basis.

The designer shall ensure that if a restraint system is required to stop a worker from getting to the point that they could fall off an unprotected edge, then they shall be used in conjunction with equipment specified and designed in accordance with Section 5.7 of this specification.

Pole straps shall not be used by Icon Water personnel and shall be limited to the maintenance of antennas, power poles and light poles by suitably trained and competent contractors. Designers shall design accordingly based on this requirement.

5.11 Fixed single-point anchor devices for personal fall arrest or restraint

Wherever practicable, the designer shall eliminate the need for the fixed installation of single-point anchor devices for personal fall arrest or restraint through the use of portable limited free fall-arrest equipment when performing inspection and maintenance activities. However, where fixed anchor points are required to be specified as part of a personal fall arrest or restraint system, they shall be specified and designed in accordance with AS/NZS 5532 and AS/NZS 1891.4 respectively.

The structure that the (single-person) single-point anchor device is to be located on shall be designed for an ultimate strength in the direction of loading of 15 kN minimum regardless of the type of fall-arrest or restraint system employed.

Prior to first use, fixed single-point anchor devices require written certification by an engineer who holds either chartered status (CPEng) with Engineers Australia, or registered professional status (RPEng) with Professionals Australia, and has the appropriate experience and competence to assess the integrity of a building or structure and anchor points. The written certification shall state that all combinations of loads in a worst case situation can be safely contained by the proposed structure at the nominated location.

A certification plate shall be provided with the details, and at a location, complying with AS/NZS 1891.4 and the engineer's approval. Refer to the Icon Water suite of standard ("SD series") drawings for an approved certification plate design.

The designer shall assume that all future inspection and testing (if required) of fixed single-point anchor devices shall be in accordance with AS/NZS 1891.4.

5.12 Signage and certification plates

Safety, warning and compliance signs specifically relating to access, egress and working at heights shall comply with AS 1318, AS 1319 and the relevant Icon Water standard drawings.

With the exception of sewer maintenance holes, permanently fixed signage shall be provided at the point of entry (e.g. on the access hatch or self-closing gate etc.) for the following situations:

- a) **Confined spaces:** Signage type and fixing locations shall comply with the requirements of AS 2865.
- b) **Low headroom:** "Low Headroom" signage shall be fixed at the point of entry to the low headroom area (e.g. on an access hatch, door or wall) as well as prominently within the low headroom area itself if required.
- c) **Maximum load:** Access hatches and covers which are not rated to the same loads as that of the surrounding platform, walkway, cover-set or structure etc., shall have a maximum rated load clearly indicated on the hatch and cover by way of a sign or decal.
- d) **Manual handling:** Any access hatch or cover which is required to be manually opened or lifted (i.e. without mechanical assistance) shall have the mass of the access hatch or cover clearly indicated by way of a sign when it has a mass greater than 20 kg. The sign shall be fixed to the access hatch or cover.
- e) **No step:** Any structure or item which is not rated for pedestrian use shall be clearly marked by way of a sign or decal affixed to the surface.

- f) **Fall arrest anchor points and davit bases:** A certification plate complying with Icon Water's standard drawings and AS/NZS 1891.4 shall be provided for each permanently installed anchor point and davit base which is designed to be used for personal limited free-fall arrest purposes. Such certification plates shall be provided at locations complying with the requirements of AS/NZS 1891.4 and Icon Water's suite of standard drawings.

The requirements for other types of signage and certification plates shall be determined by the designer in consultation with Icon Water workers (or their immediate supervisors) as part of the Icon Water SiD process.

5.13 Trip and slip hazards

5.13.1 Public footpaths, designated access zones and walkways

Designers shall ensure that permanently installed items do not present as a trip or slip hazard in public footpaths, designated access zones and walkways. The following permanently installed items shall be eliminated within public footpaths, designated access zones and walkways:

- a) **Unevenly laid walking surfaces:** The allowable vertical tolerance between sections of walking surfaces (e.g. between floor gratings) shall be as detailed in AS 1657. If compliance with AS 1657 cannot be achieved in a reasonably practicable manner for an existing Icon Water asset, then the leading edge(s) of any protruding walking surface sections shall be bevelled in accordance with the requirements of Section 5.13.3.
- b) **Protrusions above walking surfaces:** Protrusions such as but not limited to lips, handles, bolt heads, studs, hinges, locks, inspection flaps etc. shall be "flush fit" (i.e. the protrusion shall be limited to a maximum of 5.0 mm) unless such items are located within a designated public footpath - in such instances, no protrusions are allowed. Otherwise, the edge(s) shall be bevelled in accordance with the requirements of Section 5.13.3.

Proprietary anti-slip products such as nodules and pre-formed tiles with serrations and undulations are permitted to have protrusions greater than 5.0 mm. These products should be considered by designers when highly polished or very smooth surfaces are used for designated access zones, platforms, landings and walkways (refer to Fig. 5.13.1.1 and 5.13.1.2 for examples). Otherwise, the designer shall specify surface finishes for access zones, platforms, landings and walkways that have sufficient anti-slip properties, especially if it is likely that they are required to be walked upon when wet.



Fig. 5.13.1.1 Proprietary anti-slip tiles embedded within a stairway landing



Fig. 5.13.1.2 Proprietary anti-slip tiles embedded within a public footpath

5.13.2 Other areas

When items such as access hatches, covers, davit bases, anchor points etc. are not located within a designated access zone or walkway, design measures should still be taken to ensure that trip hazards are eliminated. Potential design measures to be considered include: bollards, guardrails, covers, yellow painted lines and the painting (yellow) of hinges and handles etc., false floors and edge bevelling. Note: “Yellow” shall be “Y15 Sunflower” to AS 2700.

5.13.3 Edge bevelling – Walkways, access zones, platforms and public footpaths

The bevelling of edges which protrude vertically more than 5.0 mm above the surrounding surface shall be required if it is not reasonably practicable to eliminate a protrusion or uneven (designated) walking surface any other way. This shall be achieved by using a maximum bevel of 45° for surface level differentials up to 12.5 mm, and a maximum bevel of 20° (or ramps) for surface level differentials greater than 12.5 mm. Refer to Fig. 5.13.3.1 for details.



Fig. 5.13.3.1 Edge bevelling of a surface differential (i.e. floor mat) in a doorway

5.14 Fixed platforms, walkways, stairways and ladders

The design details of fixed platforms, walkways, stairways and ladders shall fully comply with the requirements of AS 1657 as amended by the Icon Water document titled *STD-SPE-G-009 Supplement to AS 1657 fixed platforms, walkways, stairways and ladders – design, construction and installation*. Additional requirements are as follows:

- a) Removable ladder extension stanchions shall not be specified by designers without the written approval of the relevant Icon Water Principal Engineer. When access is provided by a permanently fixed twin style rung or step ladder through an access hatch or cover, then the ladder stanchions shall either be permanently fixed at the top landing (preferred) or shall be the extendable “pull-up” type. Extendable stanchions shall have a mass of no greater than 12 kg and shall not be “pulled-up” when standing on any ladder.
- b) Wherever practicable and if extendable “pull-up” stanchions are specified, they should be able to be extended without the access hatch being opened.
- c) If a low headroom scenario cannot be eliminated in a reasonably practicable manner, then permanently fixed signage in-conjunction with permanently fixed bump protection measures shall be installed. Bump protection measures include the installation of padding on bump hazards and plastic chains installed just below and just prior to the bump hazard so that they impact gently on the worker’s head warning of a potential bump hazard.

Specific requirements for fixed ladders and platforms are provided in Section 6 of this specification for specific water and sewerage network and facilities asset types.

5.15 Access hatches and access covers

5.15.1 General

It is Icon Water's intention that the type, size and style of access hatches and covers are limited in number so that:

- a) Worker emergency response plans can be standardised wherever possible so that training and rehearsal activities are conducted efficiently.
- b) Design costs are reduced.
- c) Maintenance costs are reduced.
- d) The diversity of fall restraint, free-fall arrest, fall protection and work positioning systems is limited so that availability and vehicle carrying capacity is improved.

5.15.2 Design principles and generic requirements

Icon Water's suite of standard drawings as well as the specific requirements of Section 6 of this specification are based on the design principles and generic requirements detailed in this section. Where a standard drawing depicting a particular worker access cover or hatch does not already exist within Icon Water's suite of standard drawings, or if Section 6 of this specification is "silent" with regards to specific requirements, then the designer shall use the principles provided in table 5.15.2.1 as a basis for the design.

Table 5.15.2.1 Access hatch and cover design principles

No.	Principle	Generic Requirements
1	<p><u>Requirement for buried maintenance structures</u></p> <p>Access hatches and access covers are not required for all buried maintenance structures.</p>	<p>Access hatches or access cover are not required for buried maintenance structures which meet all of the following criteria:</p> <ul style="list-style-type: none"> a) They are to be located within a locked and security monitored facility (e.g. within a treatment plant). b) Inclement weather will not cause a design life, access or maintenance issue. c) Litter, leaves and branches and other such debris will not accumulate to the extent that they will cause an access or maintenance issue. d) The likelihood of kangaroos (or other animals) falling/jumping into the buried maintenance structure is determined to be “negligible” or “low” in accordance with Icon Water risk assessment procedure. e) The fall potential is limited to a maximum of 3.0 metres. f) Fixed guardrails in-conjunction with a self-closing gate at each access point are to be installed. g) Fixed ladders are to be installed and they shall be fitted with fixed stanchions extending above the landing to the top rail of the fixed guardrailing system.
2	<p><u>Trip hazards and load ratings</u></p> <p>Access hatches and access covers do not need to be designed to meet the requirements of a designated access zone or walkway unless they are located within a designated access zone or walkway.</p>	<p>Access hatches and covers located within public footpaths must not have any protrusions.</p> <p>Access hatches and covers located within designated access zones and designated walkways must be designed as “flush fit”.</p> <p>Access hatches and covers not located within public footpaths, access zones and walkways may have protrusions greater than 5 mm above the surrounding surface (e.g. locks, hinges, handles) and may be rated for lower loads than the surrounding platform or walkway etc. The raised protrusions shall be suitably highlighted.</p> <p>The designer shall refer to Section 5.13 of this specification and Icon Water document <i>STD-SPE-G-009 Supplement to AS 1657 Fixed Platforms, Walkways...</i> for additional details.</p>

No.	Principle	Generic Requirements
3	<p><u>Dimensions</u></p> <p>With the exception of (i) trafficable access covers located within vehicular areas, and (ii) sewer maintenance hole access covers, and (iii) scour chamber access covers...</p> <p>All access hatches shall have dimensions allowing full compliance with AS 1657 with regards to clearances etc. when using ladders and stairways, and they shall be sized to be within the range of use of the portable barrier systems detailed in the Icon Water <i>Approved Products List</i> (STD-SPE-G-006).</p>	<p>Sewer maintenance holes shall have a minimum clear opening diameter of 610 mm.</p> <p>Scour chambers and trafficable covers shall have a minimum clear opening of either $\Phi 610$ mm for circular openings, or 600 x 600 mm for square or rectangular openings.</p> <p>The designer shall note that inclined ladders and stairways require larger access hatches than vertical ladders.</p> <p>Multiple sets of Icon Water approved portable barriers can be connected together. Preferably, no more than two complete sets (i.e. 8 panels) shall be used per opening.</p>
4	<p><u>Hazardous manual tasks</u></p> <p>Access hatch and access cover weights for manual handling shall be as detailed in this specification.</p>	<p>The designer shall comply with Table 5.5.2.1 of this specification.</p>
5	<p><u>Fixed assisted lifting devices</u></p> <p>Permanently installed assisted lifting devices that rely on electrical power, hydraulic power or gas-charge shall not be used.</p>	<p>Fixed assisted lifting devices shall not be used for access hatches and covers due to (i) the fact that they are an additional maintenance item and (ii) workers have been injured when relying on such devices to keep access hatches open during maintenance activities.</p> <p>Fixed assisted lifting devices include gas struts, hydraulic rams and electric-motor driven winches and positioners.</p>
6	<p><u>Proprietary access covers and cover systems</u></p> <p>Proprietary access covers and cover systems shall not be specified by designers for applications where personnel access is required.</p>	<p>The designer shall only specify access covers and cover systems which meet the requirements of Icon Water's suite of standard drawings and this specification.</p> <p>Proprietary access covers (e.g. "McBern's lids") do not always allow Icon Water standard worker emergency response plans to be enacted without modification.</p> <p>Note: Proprietary access covers may be used for equipment (not worker) access if written approval is obtained from the relevant Icon Water Principal Engineer.</p>

No.	Principle	Generic Requirements
7	<p><u>Secondary fall prevention mesh</u></p> <p>If pull-up ladder stanchions are to be installed below the access hatch, and if it is not practicable to either (i) pull-up these stanchions without opening the access hatch, or (ii) pull-up these stanchions without attaching to a limited free-fall arrest system, then removable protective mesh shall be installed directly below the access hatch.</p>	<p>Secondary protective mesh is not required in sewer maintenance holes and other buried maintenance structures where the access covers are required to be rated for trafficable loads.</p> <p>The secondary protective mesh shall be capable sustaining a single worker fall from the landing whilst still being kept in place. Permanent deformation is acceptable.</p> <p>The secondary protective mesh shall meet the manual handling requirements for access hatches shown in Table 5.5.2.1 of this specification.</p> <p>The designer shall assume that in the event of a fall the mesh will be replaced.</p>
8	<p><u>Hinged, lift-up or sliding</u></p> <p>Access hatches shall be hinged unless they are considered to be not reasonably practicable for a particular application.</p>	<p>Access hatches shall be hinged to make it easier for workers to (i) avoid direct lifting of awkward loads, and (ii) avoid dropping the hatch into the buried maintenance structure when replacing it.</p> <p>Access hatches used for instruments may be of the “lift-off” type when the access hatch size is only to be used by the worker for “reaching in” and the hatch is limited to no greater than 450 mm x 450 mm (for non-circular hatches) or $\Phi 450$ mm (for circular hatches) and of a mass less than 16 kg.</p> <p>Designers should avoid the use of sliding access hatches due to the extra operating footprint required. The roofs of existing reservoirs are the most common locations for sliding access hatches.</p> <p><u>Note:</u> For tanks, reservoirs and similar structures, it is Icon Water’s preference that a side entry maintenance flange (complete with fixed davit) are provided in addition to roof access hatches. If specified, the side-entry maintenance flange shall be of sufficient size to allow for the entry of scaffolding poles, stretchers and ancillary items.</p>
9	<p><u>Fold-flat or 95° open</u></p> <p>All hinged hatches and covers shall open 95° unless the headroom beneath the hatch or cover (located above the immediate walkway or access zone below) is determined to be “low headroom”.</p>	<p>If fold-flat hatches and covers are required due to “low headroom” then they shall:</p> <ol style="list-style-type: none"> a) Be capable of being walked upon (i.e. flush fit). b) Be supported by a concrete apron or hardstand area. c) Allow for approved portable barriers to be positioned on them for edge protection purposes and portable davit installation purposes. <p>“Low headroom” is only practicable when there are no more than two rows of (access) covers</p>

No.	Principle	Generic Requirements
		<p>provided. If more than two rows of (access) covers are required, the designer shall increase the headroom of the asset in accordance with the platform and walkway headroom requirements of AS 1657 and specify the mandatory installation of 95° open covers in-conjunction with fixed covers or a concrete slab (unless a sliding cover system is determined to be more practicable).</p> <p>When 95° open access hatches and covers are in the open position, they shall be capable of being secured in such a way which prevents them from being closed when accidentally bumped or blown in a strong wind.</p>
10	<p><u>Gas tight</u></p> <p>All access hatches and covers located within sewer pump station wet wells, emergency storage tanks and collection maintenance holes; and the sewerage network are required to be gas tight.</p>	<p>All access hatches and covers located within the sewerage network are required to be gas tight unless the SiD review undertaken during the design process determines otherwise.</p>
11	<p><u>Additional hatches for worker emergency response plans</u></p> <p>An additional hatch or hatches may be required to be specified for an asset to ensure that a safe and effective worker emergency response plan can be carried out if required.</p>	<p>Inclined rung ladders, step ladders and any ladder with a cage does not necessary allow for unencumbered winching line access when a davit or tripod-based limited free-fall arrest system is to be employed. In such situations, the designer shall specify the inclusion of an additional access hatch (or hatches) when a worker emergency response plan requires the use of a davit or tripod with a winching cable located vertically within the access opening, or for situations where stretchers are required to be lifted in/out of the structure.</p>
12	<p><u>Fixed covers</u></p> <p>With the exception of hatches and covers provided for access, all other covers shall be fixed unless there is a “low headroom” condition directly below the cover set (as per Principle No. 9) and no more than two rows of covers are to be installed.</p>	<p>Grid mesh (e.g. Webforge grating) covers shall be fixed with Webclips or similar if they are not required to be removed for routine or minor scheduled inspection and maintenance activities. These fixed covers shall be capable of being removed easily when major planned or unplanned maintenance activities are performed.</p>

No.	Principle	Generic Requirements
13	<p><u>Fixed covers and support beams for buried maintenance structures – craneage</u></p> <p>If fully-flat access covers are not required, then buried maintenance structures shall have their grid mesh, treadplate or concrete slab cover system (which also incorporates any support beams and edging supports) designed so that they are capable of being lifted off via crane in as few a crane lifts as possible.</p>	<p>Fixed cover systems constructed of grid mesh (e.g. Webforge grating), treadplate or a combination of treadplate and gridmesh (e.g. Webplate) are typically supported via framing around the perimeter of the cover system as well as through intermediate support beams. It is a requirement that the designer ensure that all support beams and covers are removed in a single lift, or in as few lifts as possible. This shall be facilitated by having the support beams permanently fixed to the covers.</p> <p>The designer shall only specify loads that can be handled by ACT-based crane service providers.</p> <p>Note: In some design scenarios, a formal lifting study may be required. This should be considered as part of the SiD process.</p>
14	<p><u>Reinforced concrete slab cover systems – future lifting for major maintenance</u></p> <p>When a reinforced concrete slab is specified as a fixed cover (with access hatches provided as appropriate) the designer shall not rely on the use of “Swift Lift” lugs or similar for lifting during major maintenance activities.</p>	<p>The designer shall ensure that the reinforced concrete slab and underside clearances are such that appropriately spaced lifting beams can be temporarily installed underneath when the slab needs to be removed for planned or unplanned major maintenance activities.</p> <p>The designer shall not rely on lifting lugs embedded within the reinforced concrete slab for anything other than the initial construction lifts as these lugs cannot be easily verified as being capable of sustaining the required load once they have been installed for a number of years.</p> <p>The designer shall specify the spacing, type, quantity and size as well as any sequencing activities for future lifting arrangements in their SiD report and on the relevant design drawings.</p>
15	<p><u>Lifting attachments for hazardous manual tasks</u></p> <p>When access hatches and access covers are required to be manually handled, the designer shall incorporate handles rather than slots wherever practicable.</p>	<p>Handles allow for easier lifting and do not require the use of hand protection (e.g. gloves) in all circumstances.</p> <p>The requirement for handles is not practicable for trafficable covers. In such circumstances, slots or lifting trunnions (or similar) shall be specified.</p> <p>The requirement for handles is not necessarily practicable for hatches and covers of mass less than 10 kg.</p>
16	<p><u>Ladder top rung/step integral to access cover</u></p> <p>Wherever practicable, the top rung or step of the ladder shall be incorporated into the design of the access hatch system.</p>	<p>The designer should consider if it is practicable to have the top rung of a twin-style rung ladder, or the top step of an inclined step ladder, finish level with the top of the landing by having an access hatch which is part fixed and part hinged.</p>

No.	Principle	Generic Requirements
17	<p><u>Limiting corrosion of buried assets</u></p>	<p>Corrosion of assets within a buried maintenance structure is an important design consideration when selecting access hatches and covers.</p> <p>Assets within buried maintenance structures with no cover or open grating covers typically undergo a significantly lower rate of corrosion compared to enclosed (webplate or stiffened checker plate) covers.</p> <p>For this reason, enclosed covers are only to be used where required for a specific purpose such as; providing a gas-tight seal, vandalism prevention or reducing rubbish/debris ingress.</p>

5.16 Doors and other openings

When the designer is required to specify doors and other access openings, they shall be specified in accordance with the NCC. If the NCC is “silent” on a particular type of access opening, the principles and imposed actions of the NCC shall be used as primary guidance material.

APPENDIX A – TECHNICAL SPECIFICATION UPDATE HISTORY

Update History

Issue A (29/05/17): Internal issue for internal review only.

Issue B (03/07/17): Internal and external issue for stakeholder consultation.

Issue 1 (03/01/18): Issue for mandatory use.

Issue 2 (24/03/22): Minor amendments. Re-issued for mandatory use.

Issue 2 Updates

Section	Update ^(Note 1)	
Abbreviations	Abbreviations added.	c/w and HDG added.
Definitions	Portable davit.	Definition added to clarify which davits are included when “portable davit” is referenced.
5.7.4.6	Fixed davit bases.	Table 5.7.4.6 added to provide guidance on preferred hierarchy of fixed davit bases.
Table 5.15.2.1 Item No 17	Limiting corrosion of buried assets.	Updated to include preference for open grating covers, where suitable, to limit corrosion of assets within the buried maintenance structure.
Appendix B	General minor updates.	Minor changes include: <ul style="list-style-type: none"> • “Hitch” mounted davits updated to “tow-bar” mounted davits. • Ladder note reworded to be consistent for each sheet. • GMS updated to HDG steel • “manned” updated to “staffed”
Appendix B	Standard Drawing Refs.	Updated to include relevant Icon Water SD Series Drawings.
Appendix B	Sheet 2 Sewer Pump Stations.	Item 2.6 and Note 5 added for wet wells over 12 000 mm deep
Appendix B	Type A and B Valve Chamber (Sheets 5, 8, 9, 10 and 13).	Updated to Air Valve Chamber (Rural & Semi Rural) and Air Valve Chamber (Urban Areas) to suit naming convention adopted in SD drawing series.
Appendix B	Sheet 5	Note 5 added

Notes:

1. The updates in the table above refer to additional changes in Issue 2 (compared to Issue 1) unless shown otherwise.

APPENDIX B – SPECIFIC AND GENERIC GUIDANCE FOR WORKING SAFELY AT HEIGHTS

Appendix B provides specific requirements for the specification, inclusion and design of access hatches, covers, ladders, stairways etc. for various types of water and sewerage assets. Designers shall treat the specific details provided as mandatory design requirements for new assets, and preferred design requirements for the upgrade of existing assets.

Flowcharts are also provided to assist the designer for asset types which are not specifically listed. These flowcharts shall be treated by the designer as preferred design requirements for new assets as well as for upgrades to existing assets.

APPENDIX B: SPECIFIC & GENERIC APPLICATION GUIDANCE FOR WORKING SAFELY AT HEIGHTS - INDEX SHEET

SEWERAGE NETWORK	<p style="text-align: center; font-size: small;"><u>Sewerage Network (including sewer pump stations)</u></p> <div style="display: flex; justify-content: space-around; padding: 5px;"> <div style="border: 1px solid black; padding: 5px; width: 15%;">Sewer Maintenance Hole Refer to Sheet 1</div> <div style="border: 1px solid black; padding: 5px; width: 15%;">Sewer Gauging Station Refer to Sheet 1</div> <div style="border: 1px solid black; padding: 5px; width: 15%;">Sewer Pump Station Wet Well Refer to Sheet 2</div> <div style="border: 1px solid black; padding: 5px; width: 15%;">Sewer Pump Station Valve Chamber Refer to Sheet 3</div> <div style="border: 1px solid black; padding: 5px; width: 15%;">Sewer Pump Station Emergency Storage Structure Refer to Sheet 4</div> <div style="border: 1px solid black; padding: 5px; width: 15%;">Sewerage Network Valve or Flowmeter Chamber Refer to Sheet 5</div> </div>
WATER NETWORK	<p style="text-align: center; font-size: small;"><u>Water Supply Network (including dams and reservoirs)</u></p> <div style="display: flex; justify-content: space-around; padding: 5px;"> <div style="border: 1px solid black; padding: 5px; width: 30%;">Water Supply - Above-Ground Reservoir or Tank Refer to Sheet 6</div> <div style="border: 1px solid black; padding: 5px; width: 30%;">Water Supply - Dam Intake Tower Refer to Sheet 7</div> <div style="border: 1px solid black; padding: 5px; width: 30%;">Water Supply - Valve or Flowmeter Chamber Refer to Sheet 8</div> <div style="border: 1px solid black; padding: 5px; width: 30%;">Water Pump Station - Valve or Flowmeter Chamber Refer to Sheet 9</div> </div>
SEWERAGE TREATMENT PLANTS	<p style="text-align: center; font-size: small;"><u>Sewerage Treatment Plants</u></p> <div style="display: flex; justify-content: space-around; padding: 5px;"> <div style="border: 1px solid black; padding: 5px; width: 45%;">STP - Below-Ground Valve or Flowmeter Chamber or Pump Dry-Well Refer to Sheet 10</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">STP - Below-Ground Wet Well or Tank with Pump(s) or other rotating/moving equipment Refer to Sheet 11</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">STP - Clarifier Refer to Sheet 12</div> </div>
WATER TREATMENT PLANTS	<p style="text-align: center; font-size: small;"><u>Water Treatment Plants</u></p> <div style="display: flex; justify-content: space-around; padding: 5px;"> <div style="border: 1px solid black; padding: 5px; width: 45%;">WTP - Below Ground Chamber Refer to Sheet 13</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">WTP - Below-Ground Pump Pit Refer to Sheet 14</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">WTP - Clarifier Refer to Sheet 15</div> </div>
GENERIC/MISCELLANEOUS	<p style="text-align: center; font-size: small;"><u>Other Assets (Not Covered Above) Where Height is a Consideration</u></p> <div style="display: flex; justify-content: space-around; padding: 5px;"> <div style="border: 1px solid black; padding: 5px; width: 30%;">Walkways and Platforms (within security fenced facilities) Refer to Sheet 16</div> <div style="border: 1px solid black; padding: 5px; width: 30%;">Generic Access/Egress Selection Flowchart Refer to Sheet 17</div> <div style="border: 1px solid black; padding: 5px; width: 30%;">Generic Covers & Hatches Selection Flowchart Refer to Sheet 18</div> </div>
	<p style="text-align: center; font-size: small;"><u>General Guidance - Access/Egress Between Levels and Cover/Hatch Types</u></p> <div style="display: flex; justify-content: space-around; padding: 5px;"> <div style="border: 1px solid black; padding: 5px; width: 45%;">Hierarchy of Access/Egress Methods Refer to Sheet 19</div> <div style="border: 1px solid black; padding: 5px; width: 45%;">Hierarchy of Covers & Hatches Refer to Sheet 20</div> </div>

SHEET 1
SEWERAGE NETWORK
SEWER MAINTENANCE HOLES & SEWER GAUGING STATIONS

Item	Size Ø	Depth (mm)	Approved Access/Egress Type	Cover Type (Note 4)	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
1.1	1050	<6000	Staggered step irons (Note 1)	Gas-tight circular Ø610 clear opening	Full-body harness in-conjunction with either (i) portable davit with integrated barrier (ii) tow-bar mounted davit, or (iii) tripod	Type 3 SRL in-conjunction with portable davit or tripod	SD-2201-D, SD-2202-D
1.2	1200	<6000	Fixed vertical rung ladder, S5316	Gas-tight circular Ø610 clear opening	Full-body harness in-conjunction with either (i) portable davit with integrated barrier (ii) tow-bar mounted davit, or (iii) tripod	Type 3 SRL in-conjunction with portable davit or tripod	SD-2203-D
1.3	1200	≥6000	Fixed vertical rung ladder, S5316, c/w intermediate landing at 6000 mm centres	Gas-tight circular Ø610 clear opening	Full-body harness in-conjunction with either (i) portable davit with integrated barrier (ii) tow-bar mounted davit, or (iii) tripod	Type 3 SRL in-conjunction with portable davit or tripod	SD-2203-D
1.4	1500	<6000	Fixed vertical rung ladder, S5316	Gas-tight circular Ø610 clear opening	Full-body harness in-conjunction with either (i) portable davit with integrated barrier (ii) tow-bar mounted davit, or (iii) tripod	Type 3 SRL in-conjunction with portable davit or tripod	SD-2203-D
1.5	1500	≥6000	Fixed vertical rung ladder, S5316, c/w intermediate landing at 6000 mm centres	Gas-tight circular Ø610 clear opening	Full-body harness in-conjunction with either (i) portable davit with integrated barrier (ii) tow-bar mounted davit, or (iii) tripod	Type 3 SRL in-conjunction with portable davit or tripod	SD-2203-D

Notes:

- Ø 1050 sewer maintenance holes and sewer gauging stations are not preferred. Choose Ø1200 or Ø1500 wherever possible.
- Sewer gauging stations to be designed so that permanently mounted instruments can be brought (e.g. retracted) to the surface without the need to enter the gauging station.
- Ladders shall comply with AS 1657 with the exception of landing size and spacing of top rung from top of maintenance hole (as these requirements are not "reasonably practicable" for a maintenance hole).
- Rectangular gas tight covers of minimum dimensions 900 x 750 may be used for Sewer Gauging Stations. Refer to Icon Water's suite of standard drawings for details.
- Sewer maintenance holes and gauging stations are classed as confined spaces when using the criteria of AS 2865.

SHEET 2
SEWER PUMP STATIONS
WET WELLS FOR SUBMERSIBLE PUMPS

Item	Size Ø	Depth (mm)	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
2.1	1800	<12000	Fixed vertical rung ladder, SS316, c/w extendable stanchions and intermediate landing at 6000 mm centres	Separate access hatches (gas tight) above ladder for personnel access (rectangular)	Full-body harness in-conjunction with either (i) permanent davit base and permanent hand-rails, or (ii) portable integrated barrier and davit. Access hatches to open 95 degrees and be secured.	Type 3 SRL in-conjunction with portable davit.	SD-4102-C, SD-4104-C
2.2	2400	<12000	Fixed vertical rung ladder, SS316, c/w extendable stanchions and intermediate landing at 6000 mm centres	Separate access hatches (gas tight) above ladder for personnel access (rectangular)	Full-body harness in-conjunction with either (i) permanent davit base and permanent hand-rails, or (ii) portable integrated barrier and davit. Access hatches to open 95 degrees and be secured.	Type 3 SRL in-conjunction with portable davit.	SD-4102-C, SD-4104-C
2.3	3000	<12000	Fixed vertical rung ladder, SS316, c/w extendable stanchions and intermediate landing at 6000 mm centres	Separate access hatches (gas tight) above ladder for personnel access (rectangular)	Full-body harness in-conjunction with either (i) permanent davit base and permanent hand-rails, or (ii) portable integrated barrier and davit. Access hatches to open 95 degrees and be secured.	Type 3 SRL in-conjunction with portable davit.	SD-4102-C, SD-4104-C
2.4	3600	<12000	Fixed vertical rung ladder, SS316, c/w extendable stanchions and intermediate landing at 6000 mm centres	Separate access hatches (gas tight) above ladder for personnel access (rectangular)	Full-body harness in-conjunction with either (i) permanent davit base and permanent hand-rails, or (ii) portable integrated barrier and davit. Access hatches to open 95 degrees and be secured.	Type 3 SRL in-conjunction with portable davit.	SD-4102-C, SD-4104-C
2.5	4000	<12000	Fixed vertical rung ladder, SS316, c/w extendable stanchions and intermediate landing at 6000 mm centres	Separate access hatches (gas tight) above ladder for personnel access (rectangular)	Full-body harness in-conjunction with either (i) permanent davit base and permanent hand-rails, or (ii) portable integrated barrier and davit. Access hatches to open 95 degrees and be secured.	Type 3 SRL in-conjunction with portable davit.	SD-4102-C, SD-4104-C
2.6	All	>12000	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance (Note 5).				

Notes:

- 1 Sewer pump station wet wells are classed as confined spaces when using the criteria of AS 2865.
- 2 Wet Well cover(s) are to be gas tight and rectangular in accordance with Icon Water's suite of standard drawings. Proprietary systems such as McBerns Lids are not to be used.
- 3 Wet Well cover(s) shall weigh no more than 32 kg each, have lifting handles and shall be hinged so that they open 95 degrees. A locking device shall also be provided to prevent the cover(s) being blown closed in windy conditions.
- 4 Ladders shall comply with AS 1657 with the exception of landing size and spacing of top rung from top of wet well (as these requirements are not 'reasonably practicable' for a wet well).

SHEET 3
SEWER PUMP STATIONS (WITHIN THE SEWERAGE NETWORK)
VALVE CHAMBERS

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
3.1	<2000	All	Vertical rung ladder, HDG steel construction, c/w extendable stanchions to AS 1657 with exceptions as per Note 3. Only access cover directly over ladder needs to be opened.	All covers to be Webforge (open grating) style cover, hinged and lockable and to fold flat for walking on. (Note 4)	Personal fall arrest not required for depths less than 3000 mm. Temporary barriers to be erected around the work area. All covers can be walked upon when fully hinged open. Three points of contact on ladder.	To be based upon the use of a tow-bar mounted davit as first preference.	SD-4102-C, SD-4104-C, SD-8001-C
3.2	>2000 and ≤3000	All	Inclined rung ladder, HDG steel construction, c/w extendable stanchions to AS 1657 with exceptions as per Note 3. Only access cover directly over ladder needs to be opened for normal access. However, allow provision for a second hinged cover for portable davit-based rescue.	Webforge (open grating) style hatch, hinged and lockable directly over ladder and over rescue access points. All other covers to be fixed with Webclips. (Note 4)	Personal fall arrest not required for inclined rung ladders or depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers to be hinged 95 degrees open and secured. Three points of contact on ladder.	To be based upon the use of a tow-bar mounted davit or portable davit with integrated barrier. Open hinged rescue access cover panel for davit-based rescue. Alternatively, if a crane truck is available, then remove fixed access covers as required.	SD-4102-C, SD-4104-C, SD-8002-C
3.3	>3000	All	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance (Note 2).				

Notes:

- 1 Valve chambers that have Webforge style (open grating) covers are not always classed as confined spaces when using the criteria of AS 2865 however gas monitoring should take place to confirm prior to entry and during work.
- 2 Valve chambers deeper than 3000 mm will only be approved under exceptional circumstances. Designer shall eliminate the need for deep valve chambers as fall arrest requirements and rescue plan requirements need careful consideration.
- 3 Ladders shall comply with AS 1657 with the exception for the requirement to have the first rung level with the top of the valve chamber concrete (when this requirement is not "reasonably practicable").
- 4 The default cover type is open Webforge grating. If vandalism is a known issue and the site cannot be fenced, then chequerplate style covers shall be used.

SHEET 4
SEWER PUMP STATIONS (WITHIN THE SEWERAGE NETWORK)
EMERGENCY STORAGE STRUCTURES (ESS)

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
4.1	≤3000	All	Vertical rung ladder, S5316 construction, c/w extendable stanchions to AS 1657 with exceptions as per Note 4. Only access cover directly over ladder needs to be opened.	Hinged rectangular access hatch(gas tight) above ladder for personnel access.	Full-body harness in-conjunction with either (i) portable davit with integrated barrier (ii) tow-bar mounted davit, or (iii) tripod. Access hatch to open 95 degrees and be secured.	Type 3 SRL in-conjunction with portable davit (preferred) or tripod (non-preferred)	SD-4102-C, SD-4108-C
4.2	>3000	All	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance.				

Notes:

- 1 Sewer pump station emergency storage structures are classed as confined spaces when using the criteria of AS 2865.
- 2 Hinged rectangular access covers to be sized such that a portable barrier with integrated davit can provide edge protection all-round.
- 3 Personnel safety grids to be installed (as secondary fall protection) below primary access covers if a portable davit with integrated barrier is not practicable.
- 4 Ladders shall comply with AS 1657 with the exception of landing size and spacing of top rung from top of ESS (as these requirements are not "reasonably practicable" for an ESS).

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
5.1	Air Valve Chamber (Rural & Semi Rural Areas)	All	Air valve chambers have been designed so that access to the quarter-turn valve can be achieved by reaching into the chamber whilst kneeling at ground level. Should any work other than inspection or isolation be required, the pre-cast riser section/s can be removed so that work can be conducted in a level and open excavation.	Webforge (open grating) style cover, hinged and lockable and to fold flat for walking on. (Note 4)	Personal fall arrest not required for inclined ladders or depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers can be walked upon when fully hinged open. Three points of contact on ladder.	Open enough hinged access cover panels completely so that a vehicle mounted davit can be used.	SD-4115-D Refer to 'Air Valve Installation (Urban Areas, Unpaved)' on drg SD-3210-D for chamber access requirements. SD-4104-C, SD-4106-C, SD-8001-C
5.2	Air Valve Chamber (Urban Areas)	All	Vertical rung ladder, HDG steel construction, c/w extendable stanchions to AS 1657 with exceptions as per Note 3. Only access cover directly over ladder needs to be opened.	Webforge (open grating) style hatch, hinged and lockable by default. (Note 4)	Personal fall restraint not required for inclined rung ladders of depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers to be hinged 95 degrees open and secured. Three points of contact on ladder.	Include additional hinged access cover panels so that a portable davit with integrated barrier or a vehicle mounted davit can be used.	SD-4104-C, SD-4106-C, SD-8002-C
5.3	<2000	All	Vertical rung ladder, HDG steel construction, c/w extendable stanchions to AS 1657 with exceptions as per Note 3. Only access cover directly over ladder needs to be opened.	Webforge (open grating) style hatch, hinged and lockable and to fold flat for walking on. (Note 4)	Personal fall arrest not required for inclined ladders or depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers can be walked upon when fully hinged open. Three points of contact on ladder.	Open enough hinged access cover panels completely so that a vehicle mounted davit can be used.	SD-4104-C, SD-4106-C, SD-8001-C
5.4	2000SD 53000	All	There are two options available (in order of preference): 1. Inclined rung ladder (if space available) 2. Vertical rung ladder Both style of ladders to be HDG steel construction, c/w extendable stanchions to AS 1657 with exceptions as per Note 3. Only access hatch directly over ladder needs to be opened.	Webforge (open grating) style hatch, hinged and lockable by default. (Note 4)	Personal fall restraint not required for inclined rung ladders of depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers to be hinged 95 degrees open and secured. Three points of contact on ladder.	Include additional hinged access cover panels so that a portable davit with integrated barrier or a vehicle mounted davit can be used.	SD-4104-C, SD-4106-C, SD-8002-C
5.5	>3000	All	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance (Note 2).				

Notes:

- 1 Valve chambers that have Webforge style (open grating) covers are not classed as confined spaces when using the criteria of AS 2865 however gas monitoring should take place to confirm prior to entry and during work.
- 2 Valve chambers deeper than 3000 mm will only be approved under exceptional circumstances. Designer shall eliminate the need for deep valve chambers as fall restraint requirements and rescue plan requirements need careful consideration. Elimination can be achieved through the use of risers (i.e. bringing pipe closer to surface) and the installation of air valves (in rural areas).
- 3 Ladders shall comply with AS 1657 with the exception for the requirement to have the first rung level with the top of the valve chamber concrete (when this requirement is not "reasonably practicable").
- 4 Webplate or stiffened chequerplate covers may be substituted for open grating cover panels in locations where rubbish or debris is likely to accumulate within the valve or flowmeter chamber.
- 5 These requirements are identical to valve chambers and flowmeter chambers within the water network.

SHEET 6
WATER SUPPLY NETWORK
RESERVOIRS AND ABOVE-GROUND TANKS

Item	Height (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan
6.1	<3000	All	Inclined step ladder (with handrails) fully compliant to AS 1657. Tools to be carried up via backpack or raised in bucket when at the top of the reservoir or for larger items a crane to be used.	Square access hatch (covered), hinged	Handrails, kickplates and a self-closing gate at the top of the ladder in full compliance to AS 1657. Hinged access hatch to open 95° and be secured. Three points of contact on ladder.	To include the use of a portable davit in-conjunction with a fixed davit base at top of reservoir or tank. Davit to be able to rotate to allow worker to be lowered to ground level.
6.2	>3000 and <4500	All	Inclined step ladder (with handrails) fully compliant to AS 1657. Tools to be carried up via backpack or raised in bucket when at the top of the reservoir or for larger items a crane to be used.	Square access hatch (covered), hinged	Handrails, kickplates and a self-closing gate at the top of the ladder in full compliance to AS 1657. Hinged access hatch to open 95° and be secured. Three points of contact on ladder.	To include the use of a portable davit in-conjunction with a fixed davit base at top of reservoir or tank. Davit to be able to rotate to allow worker to be lowered to ground level.
6.3	≥4500	Once per month or more	Stairs with intermediate platform every 6000 mm with all details to be fully compliant to AS 1657.	Square access hatch (covered), hinged incorporated into a larger sliding cover	Handrails, kickplates and a self-closing gate at the top of the stairs at each landing all in full compliance to AS 1657. Hinged access hatch to open 95° and be secured. Three points of contact on ladder.	To include the use of a portable davit in-conjunction with a fixed davit base at top of reservoir or tank. Davit to be able to rotate to allow worker to be lowered to ground level.
6.4	≥4500	Less than once per month	Inclined step ladder with intermediate platform every 6000 mm with all details to be fully compliant to AS 1657.	Square access hatch (covered), hinged	Handrails, kickplates and a self-closing gate at the top of the ladder at each landing all in full compliance to AS 1657. Hinged access hatch to open 95° and be secured. Three points of contact on ladder.	To include the use of a portable davit in-conjunction with a fixed davit base at top of reservoir or tank. Davit to be able to rotate to allow worker to be lowered to ground level.

Notes:

- 1 Tank or reservoir to also be accessed internally via ground level maintenance hole.
- 2 Hatch/cover type refers to the hatch at the top of the reservoir which may be used for internal entry (e.g. diver) if side entry is not practicable.

Item	Height (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan
7.1	All	All	<p>New designs to utilise stairs which are fully compliant to AS 1657.</p> <p>Retro-fits to existing sites to utilise inclined step ladders (with handrails) which are fully compliant with AS 1657 wherever practicable. If not practicable, move down the AS 1657 hierarchy of access/egress until a practicable solution is found.</p> <p>Self-closing gates required at every landing.</p>	Square access hatch (covered), hinged	<p>Fall restraint not required for inclined step ladders with handrails or for stairs.</p> <p>Inclined ladders do not require fall arrest systems.</p> <p>Vertical ladders ≤ 3000 mm do not require fall arrest systems due to practicality. For vertical ladders > 3000 mm in height, a 15 kN anchor bolt above the ladder or a ladder arrest system should be employed in conjunction with an approved personal safety harness.</p>	Utilise overhead gantry crane.

Notes:

- 1 Personnel safety grids to be installed (as secondary fall protection) below primary access covers.

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
8.1			Designers should look at whether the valve or flowmeter etc can be brought to above ground level and installed in a cabinet/kiosk with air valves being employed to mitigate air-locking. This may not be possible in urban areas due to air valve noise being upsetting to local residents. However, there should be no impediment for rural areas.				
8.2		Air Valve Chamber (Rural & Semi Rural Areas)	Air valve chambers have been designed so that access to the quarter-turn valve can be achieved by reaching into the chamber whilst kneeling at ground level. Should any work other than inspection or isolation be required, the pre-cast riser section/s can be removed so that work can be conducted in a level and open excavation.				SD-3210-D
8.3		Air Valve Chamber (Urban Areas)					
8.4	≤2000	All	Vertical rung ladder, HDG steel construction, c/w extendable stanchions to AS 1657 with exceptions as per Note 3. Only access cover directly over ladder needs to be opened.	All covers to be Webforge (open grating) style cover, hinged and lockable and to fold flat for walking on. (Note 4)	Personal fall arrest not required for inclined ladders or depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers can be walked upon when fully hinged open. Three points of contact on ladder.	Open enough hinged access cover panels completely so that a vehicle mounted davit can be used.	SD-3203-C, SD-8001-C
8.5	2000<D ≤3000	All	Inclined rung ladder, HDG steel construction, c/w extendable stanchions to AS 1657 with exceptions as per Note 3. Only access cover directly over ladder needs to be opened.	Webforge (open grating) style cover, hinged and lockable by default (Note 4)	Personal fall restraint not required for inclined rung ladders or depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers to be hinged 95 degrees open and secured. Three points of contact on ladder.	Include additional hinged access cover panels so that a portable davit with integrated barrier or a vehicle mounted davit can be used.	SD-3207-C, SD-3208-C, SD-8002-C
8.6	>3000	All	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance (Note 2).				

Notes:

- 1 Valve chambers that have Webforge style (open grating) covers are not classed as confined spaces when using the criteria of AS 2865 however gas monitoring should take place to confirm prior to entry and during work.
- 2 Valve chambers deeper than 3000 mm will only be approved under exceptional circumstances. Designer shall eliminate the need for deep valve chambers as fall restraint requirements and rescue plan requirements need careful consideration. Elimination can be achieved through the use of risers (i.e. bringing pipe closer to surface) and the installation of air valves (in rural areas).
- 3 Ladders shall comply with AS 1657 with the exception for the requirement to have the first rung level with the top of the valve chamber concrete (when this requirement is not "reasonably practicable").
- 4 Webplate or stiffened chequerplate covers may be substituted for open grating cover panels in locations where rubbish or debris is likely to accumulate within the valve or flowmeter chamber.
- 5 These requirements are identical to valve chambers and flowmeter chambers within the sewerage network.

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
9.1			Designers should look at whether the valve or flowmeter etc can be brought to above ground level and installed in a cabinet/kiosk with air valves being employed to mitigate air-locking. Future water pump stations designs are proposed to be above-ground installations inside secure buildings.				
9.2		Air Valve Chamber (Rural & Semi Rural Areas)	Air valve chambers have been designed so that access to the quarter-turn valve can be achieved by reaching into the chamber whilst kneeling at ground level. Should any work other than inspection or isolation be required, the pre-cast riser section/s can be removed so that work can be conducted in a level and open excavation.				SD-3210-D
9.3		Air Valve Chamber (Urban Areas)					
9.4		≤2000	No Covers: Vertical rung ladder fully compliant to AS 1657. Covers: Inclined step ladder fully compliant to AS 1657 with exceptions as per Note 3. Permanent stanchions to be installed.	No covers required if pump station is staffed 24/7 otherwise Webforge open grating covers required (Note 4).	Personal fall arrest: not required for inclined ladders or depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers can be walked upon when fully hinged open. Three points of contact on ladder.	Open enough hinged access cover panels completely so that a vehicle mounted davit can be used.	SD-3203-C, SD-8001-C
9.5		2000<D ≤3000	No Covers: Inclined step ladder fully compliant to AS 1657. Covers: Vertical rung ladder fully compliant to AS 1657 with exceptions as per Note 3. Permanent stanchions to be installed.	No covers required if pump station is staffed 24/7 otherwise Webforge open grating covers required (Note 4).	Personal fall arrest not required for inclined ladders or depths less than 3000 mm. No Covers: Permanent handrails and self-closing gate required when no covers are installed. Covers: Temporary barriers to be erected around the work area.	Include additional hinged access cover panels so that a portable davit with integrated barrier or a vehicle mounted davit can be used.	SD-3207-C, SD-3208-C, SD-8002-C, SD-8105-D
9.6		2000<D ≤3000	Inclined rung ladder, c/w extendable stanchions to AS 1657 with exceptions as per Note 3. Only access cover directly over ladder needs to be opened.	Webforge (open grating) style cover, hinged and lockable by default (Note 4).	Covers to be hinged 95 degrees open and secured. Three points of contact on ladder. Personal fall restraint not required for inclined rung ladders or depths less than 3000 mm. Temporary barriers to be erected around the work area. Covers to be hinged 95 degrees open and secured.	Include additional hinged access cover panels so that a portable davit with integrated barrier or a vehicle mounted davit can be used.	SD-3207-C, SD-3208-C, SD-8002-C
9.7		>3000	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance (Note 2).		Three points of contact on ladder.		

Notes:

- 1 Valve chambers that have Webforge style (open grating) may not be classed as confined spaces when using the criteria of AS 2865 however gas monitoring should take place to confirm prior to entry and during work.
- 2 Valve chambers deeper than 3000 mm will only be approved under exceptional circumstances. Designer shall eliminate the need for deep valve chambers as fall restraint requirements and rescue plan requirements need careful consideration. Elimination can be achieved through the use of risers (i.e. bringing pipe closer to surface) and the installation of air valves (in rural areas).
- 3 Ladders shall comply with AS 1657 with exception for the requirement to have the first rung level with the top of the valve chamber concrete (when this requirement is not "reasonably practicable").
- 4 Webplate or stiffened chequerplate covers may be substituted for open grating cover panels in locations where rubbish or debris is likely to accumulate within the valve or flowmeter chamber.
- 5 These requirements are identical to valve chambers and flowmeter chambers within the sewerage network.

SHEET 10
SEWAGE TREATMENT PLANTS
VALVE CHAMBERS, FLOWMETER CHAMBERS AND PUMP DRY WELLS

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (Inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.	
10.1	Designers should look at whether the valve or flowmeter etc can be brought to above ground level and installed in a cabinet/kiosk with air valves being employed to mitigate air-locking. Refer to the Principal Engineer's Technical Note series for guidance on the installation requirements for above-ground flowmeters.							
10.2	Air Valve Chamber (Rural & Semi Rural Areas)							SD-4115-D
10.3	Air Valve Chamber (Urban Areas)							Refer to 'Air Valve Installation (Urban Areas, Unpaved)' on drg SD-3210-D for chamber access requirements.
10.4	≤3000	Daily to once per week	External stairs with handrails when space is limited inside the chamber otherwise internal stairs. Stairs and handrails to be in full compliance with AS 1657.	No covers required as all STPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gates in full compliance with AS 1657 to be installed at the top of the stairs.	Use stairs.		
10.5	≤3000	Once per week to once per quarter	Inclined step ladder fully compliant to AS 1657.	No covers required as all STPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gate in full compliance with AS 1657 to be installed at the top of the ladder. Fall-restraint not required for inclined step ladder. Three points of contact on ladder.	Install permanently mounted davit base next to chamber/dry-well.	SD-8105-D	
10.6	≤3000	Less than once per quarter.	Vertical rung ladder if depth < 2000 mm otherwise... Inclined rung ladder, c/w extended stanchions to handrails around chamber above in full compliance with AS 1657.	No covers required as all STPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gate in full compliance with AS 1657 to be installed at the top of the ladder. Fall-restraint not required for inclined rung ladder. Three points of contact on ladder.	Install permanently mounted davit base next to chamber/dry-well.	SD-8101-D, SD-8104-D	
10.7	Chambers where D>3000	All	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance (Note 1).				N/A	
10.8	Dry Wells where D>3000	All (Note 2)	Internal stairs are the first preference if space is available otherwise the minimum requirement is inclined step ladders with handrails with intermediate platforms every 6000 mm. All ladders and platforms etc shall fully comply with AS 1657.	Hinged webplate or stiffened chequerplate covers.	Fall restraint not required for stairs or inclined step ladders. Three points of contact on stairs or ladder. Hinged access hatches to be 95 degrees open and be secured. Temporary barricades to be installed during work activities if covers are open.	Install permanently mounted davit base at top of dry well.	SD-8105-D	

Notes:

- 1 Chambers deeper than 3000 mm will only be approved under exceptional circumstances. Designer shall eliminate the need for deep valve chambers as fall arrest requirements and rescue plan requirements need careful consideration. Elimination can be achieved through the use of risers (i.e. bringing pipe closer to surface) and the installation of air valves.
- 2 The requirement for stairs or inclined step ladders is not just based on frequency of use under normal circumstances; it is also based on frequency of use when maintenance is required. It should be noted that if maintenance is required on a pump, the maintenance teams will be ascending and descending stairs or step ladders at least eight times in an 8 hour shift (due to the requirement to break for meals etc).

SHEET 11
SEWAGE TREATMENT PLANT
BELOW GROUND TANK OR WELL CONTAINING MOVING/ROTATING EQUIPMENT SUCH AS PUMPS AND MIXERS

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
11.1	All	All	Internals: Access into below-ground tank or well shall be via a fixed vertical ladder (SS316 construction) with stanchions to handrails around tank/well all in full compliance to AS 1657. Self-closing gates shall also be installed. (Note 1)	Tanks and wells shall be uncovered	For D-3000 no fall arrest is required otherwise for D-3000, a portable davit which is installed in a permanently mounted davit base shall be used.	Portable davit in-conjunction with fixed davit base.	SD-8101-D

Notes:

- 1 If the installation of a fixed vertical ladder will interfere with the hydraulic performance of the asset or with moving / rotating equipment than the designer has no option but to choose a fixed davit base which will be used to lower (via winch) the person into the asset.

SHEET 12
SEWERAGE TREATMENT PLANT
CLARIFIER OR THICKENER



Item	Height (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan
12.1	All	All	<p><u>Bridge</u>: Access/Egress to clarifier/thickener bridge shall be via stairs which are in full compliance with AS 1657. Clarifier/thickener bridge shall have handrails, grating and kickplates etc which are in full compliance with AS 1657.</p> <p><u>Internals</u>: Access into clarifier/thickener shall be via a portable davit which is installed in a permanently mounted davit base.</p>	N/A	<p>Fall arrest not required for stairs or platforms with handrails etc.</p> <p>Davit and winch to be used for access/egress in-conjunction with an approved personal harness.</p>	<p>Use stairs.</p> <p>Davit in-conjunction with approved personal harness.</p>

SHEET 13
WATER TREATMENT PLANTS
VALVE CHAMBERS AND FLOWMETER CHAMBERS

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
13.1			Designers should look at whether the valve or flowmeter etc can be brought to above ground level and installed in a cabinet/kiosk with air valves being employed to mitigate air-locking. Refer to the Principal Engineer's Technical Note series for guidance on the installation requirements for above-ground flowmeters.				
13.2		Air Valve Chamber (Rural & Semi Rural Areas)	Air valve chambers have been designed so that access to the quarter-turn valve can be achieved by reaching into the chamber whilst kneeling at ground level. Should any work other than inspection or isolation be required, the pre-cast riser section/s can be removed so that work can be conducted in a level and open excavation.				SD-3210-D
13.3		Air Valve Chamber (Urban Areas)					
13.4	≤3000	Daily to once per week	External stairs with handrails when space is limited inside the chamber otherwise internal stairs. Stairs and handrails to be in full compliance with AS 1657.	No covers required as all WTPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gates in full compliance with AS 1657 to be installed at the top of the stairs. Three points of contact on stairs.	Use stairs.	
13.5	≤3000	Once per week to once per quarter	Inclined step ladder fully compliant to AS 1657.	No covers required as all WTPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gate in full compliance with AS 1657 to be installed at the top of the ladder. Fall-restraint not required for inclined step ladder. Three points of contact on ladder.	Install permanently mounted davit base next to chamber/dry-well.	SD-8105-D
13.6	≤3000	Less than once per quarter.	Vertical rung ladder if depth < 2000 mm otherwise... Inclined rung ladder, c/w extended stanchions to handrails around chamber above in full compliance with AS 1657.	No covers required as all WTPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gate in full compliance with AS 1657 to be installed at the top of the ladder. Fall-restraint not required for inclined rung ladder. Three points of contact on ladder.	Install permanently mounted davit base next to chamber/dry-well.	SD-8101-D, SD-8104-D
13.7	Chambers where D>3000	All	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance.				

Notes:

1 Chambers deeper than 3000 mm will only be approved under exceptional circumstances. Designer shall eliminate the need for deep valve chambers as fall restraint requirements and rescue plan requirements need careful consideration. Elimination can be achieved through the use of risers (i.e. bringing pipe closer to surface) and the installation of air valves.

SHEET 14
WATER TREATMENT PLANTS
BELOW GROUND PUMP PITS (DRY WELLS)

Item	Depth (mm)	Access Frequency	Approved Access/Egress Type	Hatch/Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
14.1	Below ground	pump pits should not be used for the pumping of raw or treated water unless it is absolutely necessary. All water pumping should be done at ground level. For the pumping of effluent, refer to Sewerage treatment plant tanks containing pumps, mixers and other moving/rotating equipment or refer to Sewerage Network Sewer Pump Station Wet Wells.					
14.2	≤3000	Daily to once per week	External stairs with handrails when space is limited inside the pump pit otherwise internal stairs. Stairs and handrails to be in full compliance with AS 1657.	No covers required as all WTPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gates in full compliance with AS 1657 to be installed at the top of the stairs. Three points of contact on stairs.	Use stairs.	
14.3	≤3000	Once per week to once per quarter	Inclined step ladder fully compliant to AS 1657.	No covers required as all WTPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gate in full compliance with AS 1657 to be installed at the top of the ladder. Fall-arrest not required for inclined step ladder. Three points of contact on ladder.	Install permanently mounted davit base next to pit.	SD-8105-D
14.4	≤3000	Less than once per quarter.	Vertical rung ladder if depth < 2000 mm otherwise... Inclined rung ladder in full compliance with AS 1657.	No covers required as all WTPs are security monitored or staffed 24/7.	Edges of chamber to have handrails in full compliance to AS 1657 all-round. Self-closing gate in full compliance with AS 1657 to be installed at the top of the ladder. Fall-arrest not required for inclined rung ladder. Three points of contact on ladder.	Install permanently mounted davit base next to pit.	SD-8101-D, SD-8107-D
14.5	Pits where D>3000	All	Non-standard installation. Refer to the relevant Icon Water Principal Engineer for guidance.				

Notes:

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Pits deeper than 3000 mm will only be approved under exceptional circumstances. Designer shall eliminate the need for deep pits as fall restraint requirements and rescue plan requirements need careful consideration. Elimination can be achieved through the use of risers (i.e. bringing pipe closer to surface) and the installation of air valves .

SHEET 15
WATER TREATMENT PLANT
CLARIFIER OR THICKENER



Item	Height (mm)	Access Frequency	Approved Access/Egress Type	Cover Type	Fall Prevention & Arrest Required (inc. Details)	Worker Emergency Response Plan
15.1	All	All	<p>Bridge: Access/Egress to clarifier/thickener bridge shall be via stairs which are in full compliance with AS 1657. Clarifier/thickener bridge shall have handrails, grating and kickplates etc which are in full compliance with AS 1657.</p> <p><u>Internals</u>: Access into clarifier/thickener shall be via a portable davit which is installed in a permanently mounted davit base.</p>	N/A	<p>Fall arrest not required for stairs or platforms with handrails etc.</p> <p>Davit and winch to be used for access/egress in-conjunction with an approved personal harness.</p>	<p>Use stairs.</p> <p>Davit in-conjunction with approved personal harness.</p>

Notes:

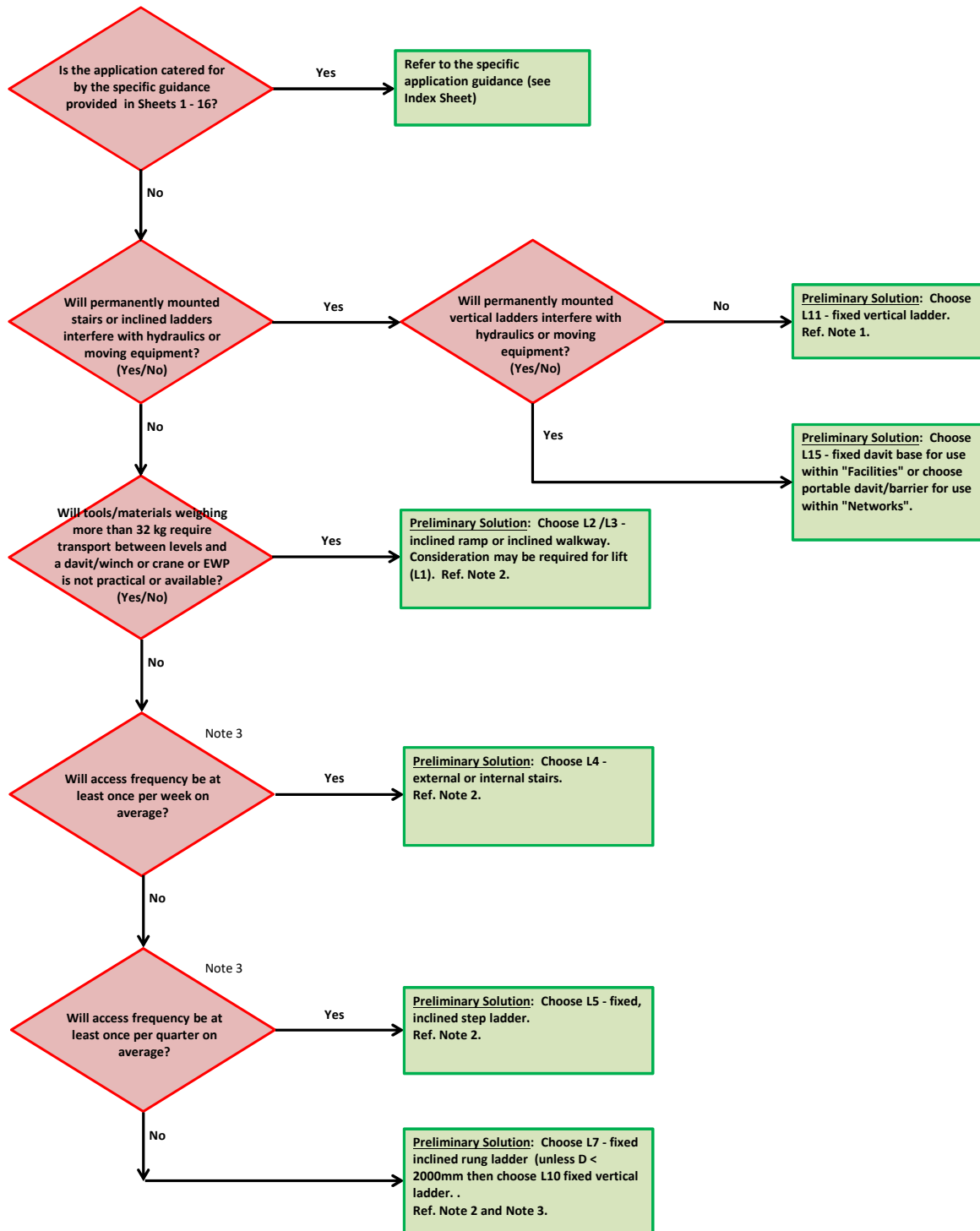
- 1 An empty, well ventilated and flow-isolated STP clarifier/thickener is not classified as a confined space to AS 2865 however gas monitoring should take place to confirm prior to entry and during work.
- 2 These requirements are identical to Sewerage Treatment Plant Clarifiers and Thickeners.

SHEET 16
GENERIC/MISCELLANEOUS
PLATFORMS AND WALKWAYS WITHIN SECURITY FENCED FACILITIES

Item	Access Frequency	Height (m)	Approved Access/Egress Type	Cover Type	Fall Restraint Required (inc. Details)	Worker Emergency Response Plan	Standard Drawing Refs.
16.1	Daily to once per week	All	Stairs with handrails. Stairs and handrails to be in full compliance with AS 1657.	N/A	Handrails and kickplates etc in full compliance with AS 1657. Self-closing gate installed at top of the stairs in full compliance with AS 1657.	Use stairs.	
16.2	Once per week to once per quarter	All	Inclined step ladder with handrails, all fully compliant to AS 1657. Intermediate platforms every 6000 mm.	N/A	Handrails and kickplates etc in full compliance with AS 1657. Self-closing gate installed at top of the ladder in full compliance with AS 1657. Ladder cages to be used if a fall > 6000 mm is possible.	Utilise portable davits without fixed bases as the first preference. If this is not practicable, then consider the installation of a fixed davit base.	SD-8105-D
16.3	Less than once per quarter.	All	If height < 2000 then a vertical rung ladder, otherwise... Inclined rung ladder with handrails, all fully compliant to AS 1657. Intermediate platforms every 6000 mm.	N/A	Handrails and kickplates etc in full compliance with AS 1657. Self-closing gate installed at top of the ladder in full compliance with AS 1657. Ladder cages to be used if a fall > 6000 mm is possible.	Utilise portable davits without fixed bases as the first preference. If this is not practicable, then consider the installation of a fixed davit base.	SD-8101-D, SD-8107-D

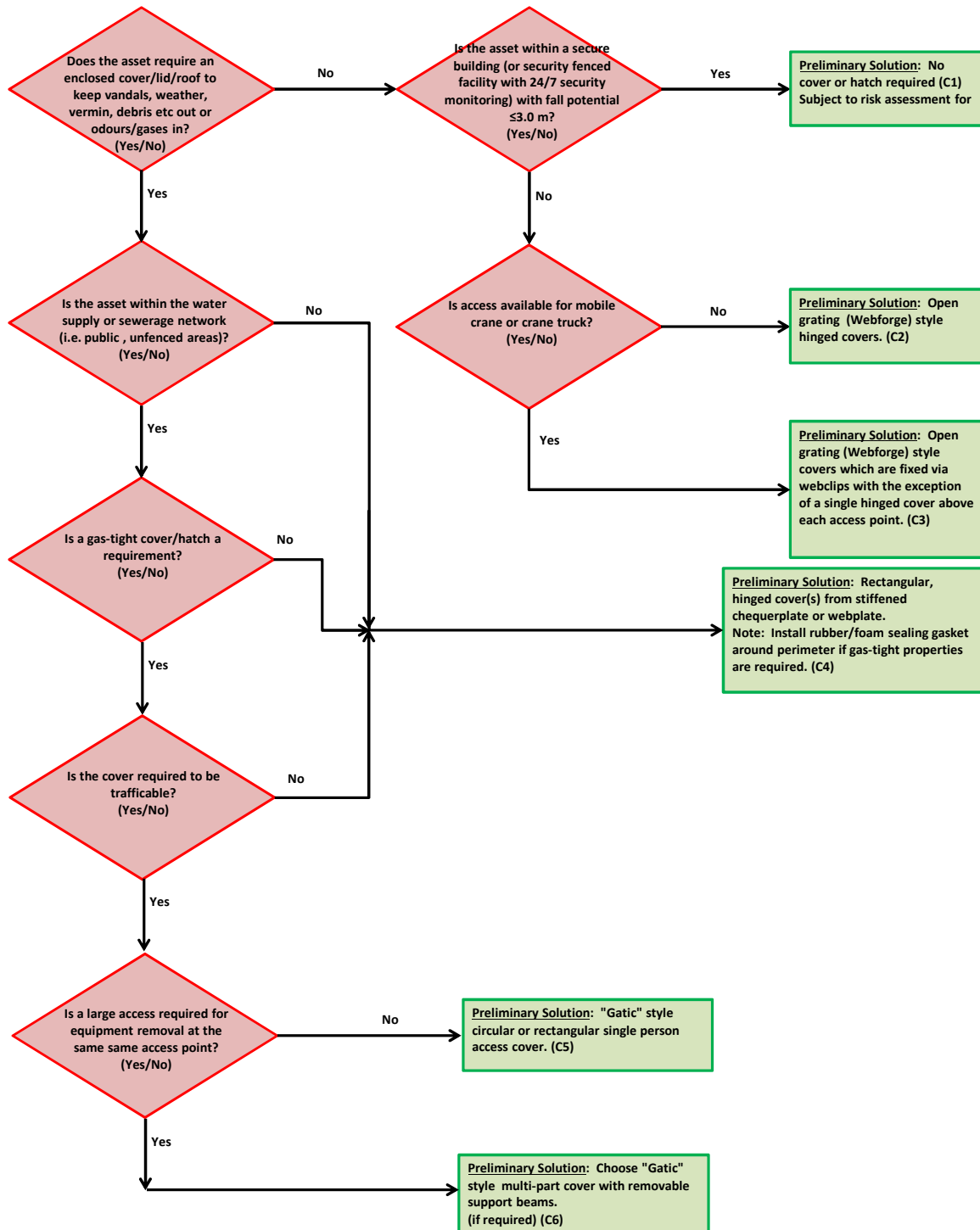
Notes:

- 1 Step-irons are only allowed in sewer maintenance holes with internal diameters 1050 mm. Step irons shall not be permitted in any other application.
- 2 Vertical rung ladders may be used for infrequent access for heights less than 2000 mm if inclined rung ladders are not practicable.
- 2 Whilst ramps have not been mentioned specifically, they are only to be used when tools, materials and equipment etc are required to be transported between levels via wheeled devices (e.g. trolleys, carts or vehicles) or when disabled access is required within or to/from office buildings, or when edge bevelling between two surface levels is not practicable. Refer to Sheet 17 for specific decision criteria.



Notes

- 1 Refer to Sheet 19 for heirachy levels relating to access/egress between levels.
- 2 For brownfield upgrades, the preliminary solution may not fit due to existing geometry and space issues. In these instances, choose the next "L-level" down in the heriachy of access/egress shown on Sheet 19.
- 3 If the height between working levels is greater than 6.0 metres and if more than 6 trips up/down are required within any 8 hour shift during major maintenance action then the minimum solution is L5 - fixed, inclined step ladder.



Notes

- 1 Refer to Sheet 20 for heirachy levels relating to covers and hatches.
- 2 For brownfield upgrades, the preliminary solution may not fit due to existing geometry and space issues. In these instances, choose the next "C-level" down in the heriachy of covers and hatches shown on Sheet 20.

"L" Number"	Access/Agress Type	Fall Protection/Arest/Restraint Details	Compliance Requirements	Notes
L1	Lift	None required	AS 1735 series of standards	To be used when no other safe and/or practical means exists for transporting tools, equipment and materials between levels of awkward geometries or mass > 32 kg. Consideration should be given to EWPs and mobile cranes before this option is considered.
L2	Level walkway (angle between 0° and 3°)	Fall potential ≤ 0.6 metres: None required Fall potential > 0.6 metres: Guardrails	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L3	Sloping walkway or ramp (angle between 3° and 20°)	Fall potential ≤ 0.6 metres: None required Fall potential > 0.6 metres: Guardrails	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L4	Stairs (angle between 20° and 45°)	Fall potential ≤ 0.6 metres: None required Fall potential > 0.6 metres: Handrails	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L5	Fixed inclined step ladder (angle between 60° and 70°) with fixed stanchions to 900mm min. above top landing	Three points of contact and handrails fitted to ladder	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L6	Fixed inclined step ladder (angle between 60° and 70°) with extendable stanchions to 900mm min. above top landing	Three points of contact and handrails fitted to ladder	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L7	Fixed inclined rung ladder (angle between 70° and 75°) with fixed stanchions to 900mm min. above top landing	Three points of contact and handrails fitted to ladder	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L8	Fixed inclined rung ladder (angle between 70° and 75°) with extendable stanchions to 900mm min. above top landing	Three points of contact and handrails fitted to ladder	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L9	Portable ladder, L = 3.0 metres (4:1 ratio of HB), securely tied off, "footed" or in fixed ladder holder. Height between levels limited to 2.0 metres max.	Three points of contact.	CI 7.1 of Safework Australia C.O.P. "Managing the Risk of Falls in the Workplace"	Portable ladders are only to be used if a fixed twin stile rung ladder is deemed to be not reasonably practicable (e.g. interference with rotating equipment etc.)
L10	Fixed Vertical rung ladder (90°) with fixed stanchions to 900mm min. above top landing	Fall potential ≤ 3.0 metres: Three points of contact Fall potential > 3.0 metres: Approved options include (i) Fixed vertical (wire) anchorage line (ii) Type III SRL used in-conjunction with tripod or davit or other certified anchor point	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L11	Fixed Vertical rung ladder (90°) with extendable stanchions to 900mm min. above top landing	Fall potential ≤ 3.0 metres: Three points of contact Fall potential > 3.0 metres: Approved options include (i) Fixed vertical (wire) anchorage line (ii) Type III SRL used in-conjunction with tripod or davit or other certified anchor point	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L12	Fixed Vertical rung ladder (90°) with no stanchion extensions (e.g. maintenance holes)	Fall potential ≤ 2.0 metres: Three points of contact Fall potential > 2.0 metres: Type III SRL used in-conjunction with tripod or davit or other certified anchor point	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L13	Staggered step irons, with (above-ground) stanchions (either fixed or portable) to 900mm min. above top landing	Fall potential ≤ 3.0 metres: Three points of contact Fall potential > 3.0 metres: Approved options include Type III SRL used in-conjunction with tripod or davit or other certified anchor point	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L14	Staggered step irons, no stanchions	Fall potential ≤ 2.0 metres: Three points of contact Fall potential > 2.0 metres: Approved options include Type III SRL used in-conjunction with tripod or davit or other certified anchor point	AS 1657 as amended by STD-SPE-G-009	Refer to STD-SPE-G-009
L15	Fixed or portable davit; or tripod and Bosun's Chair for maintenance holes	Bosun's Chair and/or Type III SRL in-conjunction with approved personal harness	Safework Australia C.O.P. "Managing the Risk of Falls in the Workplace" and other standards/codes referenced by this C.O.P including AS/NZS 1891 series.	

Notes

- With the exception of portable ladders, the access/egress methods detailed above are permanently installed items. Elevated work platforms such as scissor hoists, booms etc have not been included and are to be selected for access on a case-by-case basis taking into account; job task, hazard level, frequency of access etc.
- Single stile rung-type ladders as per Fig. 7.12 of AS 1657 are not approved for use.
- Industrial rope access systems are not a primary means of access/egress between level for Icon Water workers unless specific and regular training by a registered training organisation has been undertaken by the worker and they have been assessed as being fit for such work.
- Any permanently installed access/egress method which is not listed above cannot be used without the written approval of the relevant Icon Water Principal Engineer.
- Not used
- Step-irons are only allowed for use within 1050 dia. sewer maintenance holes, otherwise written approval must be obtained from the relevant Icon Water Principal Engineer for their use elsewhere.
- Self-closing gates (not chains) to be employed at the top landing when ladders are used in-conjunction with permanent handrail/guardrail systems.
- Designer should ensure that the "L number" (e.g. L1, L2 etc) is as low as possible so that the risk of fall is as low as reasonably practicable.

	"C Number"	Access/Cover or Hatch Type	Edge Protection Requirement	Compliance Requirements	Notes
Lowest Back Injury Risk	C1	No cover or hatch	Permanent guardrails and lockable self-closing gate	AS 1657 as amended by STD-SPE-G-009	Consideration should be given to a removable handrail section for maintenance purposes. If so, anchor points (in-conjunction with fixed lanyard and approved personal harness) are required for fall potential > 2.0 metres.
	C2	Open grating (Webforge style) hinged covers; c/w retractable lifting handles (x2 for covers > 20 kg; x 1 for covers ≤ 20 kg), keeper plates, single locking point, removable. Maximum mass per cover = 32 kg. Cut-down angle section to be cast-in to concrete surrounds or fastened to top-of-concrete to act as a retainer and flat surface for covers.	Approved portable barrier with integrated davit, size to suit single access cover above main access point.	Full compliance to AS 1657 as amended by STD-SPE-G-009.	Preferred materials of construction: 1. Galvanised mild steel (GMS) 2. Aluminium Note: Single cover above main access can be aluminium (to keep weight down) whilst all other covers can be GMS if required. Consideration should be given to integrate the top step/run of any ladder into the access cover system (e.g. one part fixed as a step, the other part hinged for opening). Larger portable barrier to be employed if all covers are opened/removed.
	C3	Open grating (Webforge style) fixed covers which are fixed with web-clips. Cover above access points (e.g. ladder or stairs below) to be a hinged cover with details as per "C2" above. Cut-down angle section to be cast-in to concrete surrounds or fastened to top-of-concrete to act as a retainer and flat surface for covers.	Approved portable barrier with integrated davit, size to suit single access cover above main access point.	Full compliance to AS 1657 as amended by STD-SPE-G-009.	Preferred materials of construction: 1. Galvanised mild steel (GMS) 2. Aluminium Note: Single cover above main access can be aluminium (to keep weight down) whilst all other covers can be GMS if required. Larger portable barrier to be employed if all covers are opened/removed.
	C4	Rectangular, hinged cover(s) from stiffened chequerplate or Webplate, c/w personal safety grilles below (if no anchor point (e.g. davit) available). Note: Install rubber/foam sealing gasket around perimeter if gas-tight properties are required. Cut-down angle section to be cast-in to concrete surrounds or fastened to top-of-concrete to act as a retainer and flat surface for covers.	Approved portable barrier with integrated davit, size to suit single access cover above main access point.	Full compliance to AS 1657 as amended by STD-SPE-G-009.	Preferred materials of construction: 1. Galvanised mild steel (GMS) 2. Aluminium Note: Single cover above main access can be aluminium (to keep weight down) whilst all other covers can be GMS if required. Larger portable barrier to be employed if all covers are opened/removed.
Highest Back Injury Risk	C5	Gatic style circular (trafficable) cover - circular or rectangular.	Approved portable barrier with integrated davit, size to suit single access cover above main access point.	Full compliance to WSAA product specifications. Full compliance to AS 1657 as amended by STD-SPE-G-009.	Cover load rating to suit vehicle axle load as per WSAA requirements. Larger portable barrier to be employed if all covers are opened/removed.
	C6	Gatic style circular (trafficable) multi-part cover system, c/w removable support beams.	Approved portable barrier with integrated davit, size to suit single access cover above main access point.	Full compliance to WSAA product specifications. Full compliance to AS 1657 as amended by STD-SPE-G-009.	Cover load rating to suit vehicle axle load as per WSAA requirements. Larger portable barrier to be employed if all covers are opened/removed.


Notes

- 1 Designers should look to locate assets out of trafficable areas wherever possible so that heavy/cumbersome Gatic style covers are not required.
- 2 "Back Injury Risk" refers to the risk of injury when lifting covers and hatches by hand or in-conjunction with Gatic lifters which require manual handling.
- 3 If a personal safety grille is installed below the primary cover than it is preferred that if extendable stanchions are used, they are to be pulled up prior to the cover being opened (i.e pull up through slots in the cover).

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