

Emergency & School Security

Specification for Security Fencing in State Schools



Emergency and School Security

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Any references to legislation are not an interpretation of the law. They are to be used as a guide only. The information in this publication is general and does not take into account individual circumstances or situations.

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Section 1 – General Information

1.1 Definitions

Security Fencing: Fencing installed for the identified purpose of providing a physical security barrier for the protection of school students, staff, visitors and assets.

Project Coordinator: School Security Advisor from the Department of Education Emergency & School Security Unit, or other representative assigned to manage the fencing project.

Materials: The raw materials later used in the construction of a fence. This includes metal tubing used for posts, rails, uprights, wooden posts, wooden rails, palings, screws, nails, welding rods. Materials can also include protective coatings such as galvanising, powder coating, stains and paint.

Products: The items cut or constructed to form fencing products including posts, capping, fencing panels, hinges, latches. This includes joining methods such as pressing, welding, riveting, adhesion, nailing to complete the product. Products also include concrete for posts and surface barriers.

Galvanised Steel: Steel manufactured in accordance with AS 1450 and AS1163, in a protective coating obtained by dipping (immersing) prepared steel in a bath of molten zinc of purity not less than 98%.

Fencing: The combination of products designed and constructed so as to form a fence.

Blending: The procedure for ensuring post construction modifications or enhancements to the final product are finished in the same colour and finish as the original material.

Rail: Horizontal form of fencing panels (primarily used in a Type 1 Security Fence).

Picket: Vertical upright forming fencing panels (primarily used in a Type 1 Security Fence).

Shroud: Steel coupling attached to the top and bottom of fence posts to accommodate the rails of Type 1 Security Fencing panels.

DoE: Queensland Department of Education.

NATA: National Association of Testing Authorities of Australia.

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1.2 Introduction

This specification outlines the specific requirements for projects delivered by the Department of Education Emergency & School Security Unit, for construction and installation of school Security Fencing. Security Fencing is fencing installed for the identified purpose of providing a physical security barrier to a school premise. This specification may also be considered for requirements of fencing materials, installation and project management practices in the application of other fencing, such as pool fences, internal safety fences and department owned residential fences.

The specification is based on Australian Standards related to the construction and installation of relevant materials and products for Security Fencing. A summary of Australian Standards referenced in this specification is listed below:

AS 4750-2003	Electrogalvanized (zinc) coatings on ferrous hollow and open sections
AS/NZS 1163-2016	Cold-formed structural steel hollow sections
AS 1397-2011	Continuous hot-dip metallic coated steel sheet and strip - Coatings of zinc and zinc alloyed with aluminium and magnesium
AS 1725.1-2010	Chain link fabric fencing - Security fences and gates - General requirements
AS 2423-2002	Coated Steel Wire Fencing Products for Terrestrial, Aquatic and General Use
AS/NZS 4792-2006	Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialized process
AS 4506-2005	Metal finishing - Thermoset powder coatings
AS 1450-2007	Steel tubes for mechanical purposes
AS/NZS 4680-2006	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 1554-2014	Structural Steel Welding
AS 4312-2008	Atmospheric Corrosivity Zones in Australia
AS 1742.13-2009	Manual of uniform traffic control devices - Local area traffic management
AS 3700-2001	Masonry Structures
AS 1170.2-2011	Structural Design Actions – Wind actions
AS 2870-2011	Residential Slabs and Footings

Australian Standards may be resourced via the DoE intranet Library Services: <https://www.saiglobal.com/online/>

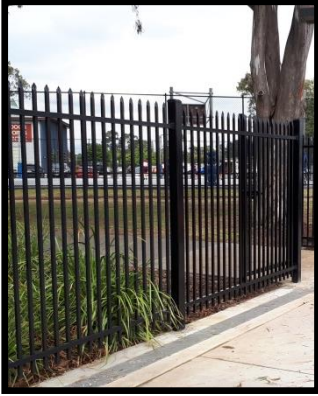
As noted in Sections 3, 4 and 5 of this specification, Type 1 and Type 3 Security Fencing panels and gates are to be black in colour. Type 2 Security Fencing is to be galvanised steel or black. As the identified purpose for Security Fencing at state schools is providing a physical measure for security, having a fence in a colour that may be more attractive to vandals is not considered best practice.

The scope of this specification does not include advice for legislative requirements of those schools which have, or are intending to have, swimming pools installed. Principals must seek to identify the legislation and/or council bylaws which govern pool fencing in their respective school precincts. School principals are responsible for the safety of staff, students and all visitors to the school under the *Work Place Health & Safety Act 2011*.

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1.3 Types of Security Fencing

There are three types of fencing endorsed by DoE as Security Fencing:



Type 1 Security Fencing: Fencing constructed from panels comprised of black spear-top steel pickets and rails, manufactured of galvanised steel tube, used predominantly for areas where the boundary line is accessible from a public space such as a foot path or road. Type 1 Security Fencing is typically 2100mm in height.



Type 2 Security Fencing: Fencing constructed from chain-link fabric, used predominantly (but not exclusive to) for areas where the school shares a boundary line with private property. Type 2 Security Fencing is typically 2100mm-2400mm in height.



Type 3 Security Fencing: Fencing constructed from welded wire mesh, used predominantly (but not exclusive to) for areas not visible to the general public, for example near creeks or in rural areas, including sporting and agricultural areas. Type 3 Security Fencing is typically 2100mm-2400mm in height.

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1.4 Security Fencing - Preliminary Requirements

- The contractor is required to submit all quotations in accordance with the Department of Education (DoE) tender process.
- DoE Project Co-ordinators may have fencing material tested at random by NATA registered company to ensure that all materials and treatments meet these specifications.
- Security Fencing projects are to be managed in accordance with DoE School Managed Facility Project practices. All works carried out in the School Security Fencing Program must conform to the Workplace Health & Safety Code of Practice 2011
- Aluminium materials, or any materials other than those noted in this document must not be used with DoE fencing projects without pre-approval from the Project Coordinator.
- This specification is to be read in conjunction with the Department of Education Standing Offer Arrangement for Security Fencing of the nominated contractor for the particular project.

1.5 Site Specific Requirements

1.5.1 Site Survey and Soil Test

- The contractor is to arrange for a Registered Surveyor to survey the school in cases where a clearly defined property boundary is not evident and/or a dispute exists about the location of a property boundary.
- Where there is uncertainty about the integrity of the soil at the location of a proposed installation of Security Fencing, the contractor is to obtain a soil test report prior to commencement of the project, and supply relevant reports to determine if further works may be involved.
- The Project Coordinator will confirm if a site survey or soil test is required.

1.5.2 Location of Services

- The contractor is to determine, prior to commencing work, the location of all underground services such as water, gas, electricity and communication pipes or lines by engaging an authorised service locator, at the contractor's expense.
- Prior to the installation of any fencing within one (1) metre of underground electrical or communication lines, consent of the applicable service provider must be obtained.
- The contractor is to ensure any services, surfaces and finishing damaged during course of construction are reinstated as part of the project, at the contractor's expense.

1.5.3 Removal of Existing Fencing

- The contractor is responsible for the removal and disposal of the existing fence and to make good as necessary, unless advised otherwise by the Project Coordinator.
- Existing fence posts are not to be re-sleeved unless requested or approved by the Project Coordinator.
- The Project Coordinator is to be notified of any posts unable to be removed. Posts unable to be removed are to be cut level to the ground, and filled with concrete to create an even path.

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1.5.4 Light Poles, Signs and/or Sub-stations

- The contractor is to redirect the fence as required to allow at least one (1) metre of clearance around any power pole, sign or sub-station or other item identified by the Project Coordinator.

1.5.5 Shrubs and Foliage

- The contractor must remove or trim trees and shrubs which could obstruct erection of the fence, or enable climbing access over the proposed fence prior to the installation of the new fence at the school. Any garden beds, grass areas or other parts of the grounds damaged by machinery without reasonable cause is to be reinstated to previous condition by the contractor at their cost.
- Replacement of plants and gardens is to be in line with the principles of Crime Prevention Through Environmental Design (the Project Coordinator is to be consulted for further information regarding this).

1.5.6 Removal of all Rubbish

- Rubbish and unwanted materials are to be stored in a secure area until disposed of. Items must be disposed of at a minimum of once per week.
- Any collected rubbish that is causing a disruption to school operations is to be removed as soon as possible.

1.5.7 Emergency access points

- Contractor to liaise with school Principal to determine location of dedicated emergency vehicle access points and is to ensure that these access points are kept clear at all times.

1.5.8 Safety

- The Business Manager will provide a Work Area Access Permit (WAAP) to the contractor. The WAAP is to be signed prior to commencing construction, and upon completion of the project.
- A Site Safety Plan and Work Method Statement are to be provided to the Project Coordinator prior to commencing construction.

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Section 2 – General Requirements for Installation

2.1 Requirements for Pre Treatment and Coating

2.1.1 Cleaning and Chemical Pre-Treatment

- The application of cleaning and chemical pre-treatment is required for all fencing panels, posts and gates, prior to application of the specified coating system, as per the following:
- New zinc surfaces are to be examined for flux residues, light roll forming oils and foreign matter, all of which are to be removed prior to pre-treatment for powder coating. All sharp edges and uneven protrusions are to be removed.
- Surfaces that show white storage stain (white rust) or other corrosion products, must be cleaned, degreased and pre-treated for optimal performance, as 'white rust' can lead to adhesion problems or out-gassing of the powder coating. Silicone based anti-spatters are not to be used as they may lead to de-wetting of the powder.
- Pre-treatment is to be carried out in accordance with Classification D (High Marine/Industrial) as per AS 4506.

A summary of pre-treatment and coating thickness requirements as per AS 4506 is below:

Atmospheric Classification	Substrate	Examples of appropriate pre-treatment	Minimum coating thickness, μm	Required Test
High Marine-Industrial	Zinc, Zinc alloys, Steel (zinc coated)	Zinc phosphate, or appropriate primer system, or chrome chromate or chrome phosphite	60	Adhesion Cure Thickness Neutral salt spray Humidity Permeability Durability Holiday

- Powder application must occur within 24 hours of substrate pre-treatment.
- Pre-treatment systems are to be maintained and tested in accordance with the pre-treatment supplier's recommendations.

2.1.2 Minimum Coating Requirements

- The standard coating for DoE Security Fencing is a hot dip galvanised zinc coating, appropriate for Corrosion Category C3 (coastal and/or industrial land, with a mild steel corrosion rate 25 to 50 $\mu\text{m}/\text{y}$), as per AS 4312. A coating mass of ZB135/135(Z275) as per AS 4792 is required as a minimum:

A summary of coating mass of ZB135/135 (Z275) as specified in AS4792 is below:

Coating Class	Local coating mass g/m^2 , min.	Average coating mass, g/m^2 , min.		Strip Coating Class
		External	Internal	
ZB135/135	110	135	135	Z275

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2.1.3 Coating Required in Corrosive Environments

- Depending of the location of the project, coating appropriate for Corrosion Category C4 (sea shore, with a mild steel corrosion rate 50 to 80 $\mu\text{m}/\text{y}$) will be requested on an as required basis. In these cases, the required coating is one of the following:
 - A coating type of zinc, aluminium and magnesium (Type ZM) with a coating mass of ZM275 as specified in AS1397, or
 - Batch Hot Dip galvanised (after fabrication) as per AS4680.

A summary of Type ZM with a coating mass of ZM275 as specified in AS 1397, is below:

Coating class	Minimum Coating mass, g/m^2		
	Total both surfaces		One surface
	Triple spot	Single spot	Single spot
ZM275	275	250	110

A summary of Hot Dip Galvanised zinc coating (after fabrication) as per AS 4680, is below:

Article Thickness mm	Local Coating Thickness Minimum μm	Average Coating Thickness Minimum μm	Average Coating mass Minimum g/m^2
≤ 1.5	35	45	320
$>1.5 \leq 3$	45	55	390
$>3 \leq 6$	55	70	500
>6	70	85	600

NOTE: 1 g/m^2 coating mass = 0.14 μm coating thickness

2.1.4 Paint Coating

- An epoxy primer of 50-60 μm must be applied to the pre-treated substrate in accordance with AS 4506 (a 'green cure' is recommended when applying the primer, whereby the primer is half cured before applying the topcoat).
- The topcoat shall consist of a polyester powder coating, black in colour, and in a gloss finish, applied in accordance with AS 4506 to a minimum of 80 μm , with a total coating thickness of 130-140 μm .
- For corrosive environments, a Class 1 abrasive 'whip' blast is to be applied before the epoxy primer;
- The polyester powder coating topcoat must meet or exceed durability, UV stability, and colourfastness requirements of AS 4506.
- The powder must be fully cured as per the powder manufacturer's specification.

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2.2 Clearance and Welding

- The contractor is to allow one (1) metre around objects including those identified in [Sections 1.5.2 and 1.5.5](#), however if this is not possible, the panels where services or foliage are within one (1) metre of the fence line are to be fitted with powder coated perforated steel mesh.
- If any onsite welding is required, it is to be pre-approved by Project Coordinator, and carried out in accordance with AS/NZS 1554:2014, Structural Steel Welding. Repairs to cut or damaged powder coated material are to be made using an appropriate anti-corrosion treatment and coating system that provides the same protection and appearance as the finished product.

2.3 General Requirements for Panels

- The contractor must ensure that full panels are installed on both sides of all gates wherever practical.
- All panels are to be fitted with a maximum ground clearance of 150mm.
- Where ground clearance exceeds 150mm, the panels are to be stepped or raked to achieve the foregoing level of clearance.
- Stepped panels must be a minimum width of 1200mm.
- After stepping or raking, in-fills are to be fitted and rigidly fixed beneath panels where the ground clearance still exceeds 150mm.
- Barbed wire must not be used as an in-fill underneath panels.

2.4 General Requirements for Gates

- The contractor is to allow for the following types and sizes of gates:
 - Hinged single gates 1 – 3 metres
 - Hinged double gates 2.4 – 7 metres
 - Sliding gates As required
 - Counter-lever gates As required
- Gates are to be manufactured as per the relevant requirements for that particular type of Security Fencing as detailed in Sections 3, 4 and 5.
- All hinged gate/s are to be constructed and installed so as to enable the gate/s to be locked in the fully open and closed position. Gates are to open and fold back 180 degrees where ground contours allow.
- Receiving latches are to be fitted to enable gate/s to be secured with heavy duty padlocks in the open and closed position.
- Galvanised ground sleeves, for the security of drop bolts with the gates in the open and closed position, are to be installed in concrete so as not to present a trip hazard. Ground domes must be high enough to inhibit dirt/water ingress and painted yellow to indicate a possible hazard.
- All bolts used for panel and gate hinge fixings must be anti-tamper bolts to prevent the removal of nuts.
- Speed humps must be installed under vehicular gates where the ground clearance exceeds 150mm. Installation of speed humps is to be in accordance with AS 1742:2014 Manual of Uniform Control Traffic Devices.
- The width of all gates is to be in accordance with the provided scope of works for each project.

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2.5 General Requirements for Vehicle Gates

- Vehicle access gates must be recessed within the property boundary, where identified as required for safety, to enable vehicles to stop off road to allow opening and closing of the gate.
- Where a reasonable concern for traffic safety exists, and the Project Coordinator has given pre-approval, returns are to be splayed to maximise sighting of passing vehicles and pedestrians.

2.6 General Requirements for Posts and Post Holes

- Fence posts, including corner and intermediate posts, are to be installed as set out in the relevant sections for the respective fence type as specified below.
- A post hole (also referred to as a dig) is a machine-drilled or hand dug hole in soil, rock or other than rock material. All post holes are to be installed as set out in the sections for the respective fence type:
 - Section 3 for Type 1 Security Fencing;
 - Section 4 for Type 2 Security Fencing;
 - Section 5 for Type 3 Security Fencing.

2.7 General Requirements for Gate Posts

- Gate posts are to be set as specified in the relevant Section for each fence type. The above ground concrete finish is to be domed with a steel trowel finish to eliminate water lying at base of posts.
- Doming of concrete at base of posts must be performed at the time of the concrete pour.

2.8 General Requirements for Padlocks

- The contractor is to supply all heavy-duty padlocks (ABUS 83/50 or equivalent) to allow all gates to be locked. Padlocks are to be keyed to the school registered master key system. This should be confirmed with the Project Coordinator before locks are installed.

2.9 Site Storage and Protection

- Unless alternative arrangements are approved by the Project Coordinator before commencement of the project, the contractor is to store all goods, materials and equipment (including any shed or portable toilet), on site within the school boundary in a manner that will avoid hazards and/or interruptions to school operations, and will not affect neighbouring properties.
- Goods, materials and equipment is to be stored within a secure construction safety fence (ATF type or similar). Construction fencing used to store equipment is to be a minimum height of 2100mm.
- Safety fencing is to be provided to all work areas including areas where existing fencing is removed until new fencing is installed. The removal of existing fences should be limited to areas that can be protected. The type of safety fencing required and the timing of installation of the safety fencing are to be determined in accordance with the Construction Safety Plan as described in Workplace Health & Safety procedures. Non rigid bunting style barrier is not acceptable.

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Site Storage and Protection cont.

- The excavation of post holes is to be limited to areas that can be backfilled within the day. Control measures are to be provided to protect the site in accordance with the construction safety plan as described in Workplace Health & Safety procedures. Trip and subsidence hazards are to be avoided.
- The type of protection required and the timing of the protection works is to be determined in accordance with normal safety procedures exercised on a designated construction site.

2.10 General Requirements for Returns

- In places where a Security Fence is to adjoin with another type of fence on a private property (for example a timber or brick fence) which faces a public space such as the road or footpath, a step point can be created by the private fence. In these cases, the security fence is to proceed along the front street line of the school to the adjoining property, and then a return is to be provided along the adjoining property boundary to provide adequate security for the school.
- Returns are also required where the Security Fence is to adjoin to a pre-existing internal fence in the school grounds.
- The relevant Scope of Works, provided for each project, will include any required provisions for this.

2.11 General Requirements for Block Walls/Celebrated Entryways

- Where block walls are included as part of a project scope of works for a celebrated entryway, the wall height should be 100mm above the total height of the fence line. Any alterations to existing block walls, or security features required to be affixed to the top of block walls, will be specified by the Project Coordinator.
- The contractor is to redirect the fence as required to allow at least one (1) metre of clearance around any existing block walls which will create step points.
- Any block walls or retaining walls built as part of the project must have relevant Council approvals, be assessed and certified by a qualified engineer, and comply with the requirements of AS 3700-2001.

2.11 Electricity and Water

- The Contractor must arrange with the Project Co-ordinator at the time of initial consultation as to the availability of electricity and water if required. Reasonable access to electricity and water will be provided by the school Principal.

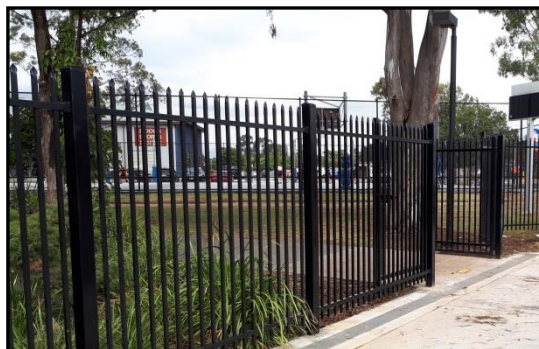
2.12 Key Safe/Garage

- Where specified in the project scope of works, a solid metal housing key safe, suitable for holding padlock keys, is to be affixed to a post of the fence at a location nominated by the Project Coordinator.
- Key safes are to be constructed from zinc die-cast or equivalent, and have a 10 digit code panel with a plastic weather cover.
- Additional key safes will be requested on an as required basis.

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Section 3 – Type 1 Security Fencing

Type 1 Security Fencing is constructed from panels comprised of black spear-top steel pickets and rails, manufactured of galvanised steel tube, used predominantly for areas where the boundary line is accessible from a public space such as street frontage or parkland.



Picture 3.1: A standard Type 1 Security Fence

3.1 Type 1 Security Fencing - Summary

Manufacture	Steel pickets and rails, manufactured from galvanised steel tubing, in accordance with AS 1450 and AS 1397 to a steel Grade of C250 (Summary of C250 below)
Height	A minimum standard of 2100mm (heights above this level will be requested on an as required basis)
Panel Length	2400mm minimum and 2500mm maximum
Number of Rails	Two (2)
Rail Measurements	40mm x 40mm x 2.0mm thickness
Top Rail Position	200mm - 270mm from the top of pickets
Rail Centres	1690mm – 1770mm (dependant on height of picket above rail)
Pickets	25mm x 25mm x 1.6mm in thickness x 2100mm in length, punched through 40mm square x 2.0mm rails, and welded on alternative sides of the top and bottom of both rails with silicon bronze wire
Picket Spacing	A standard of 125mm between picket centres, and 115mm between picket centres for preparatory (Prep) area fencing (115mm picket gaps may also be requested on an as required basis)
Picket Tops	Cut and pressed (crimped) to form a spear point top. Spear tops are to be made from the same piece of steel tubing as the picket and not attached after manufacture.
Welding	Welded on alternative sides of the top and bottom of both rails, with silicon bronze wire (i.e. four welds per picket), as per diagrams 3.1 and 3.2 below.
Ground Clearance	Raised off of the ground, with a 150mm maximum clearance
Coating	Fully powder coated to meet the requirements as detailed in Section 2.1: Pre-Treatment and Coating

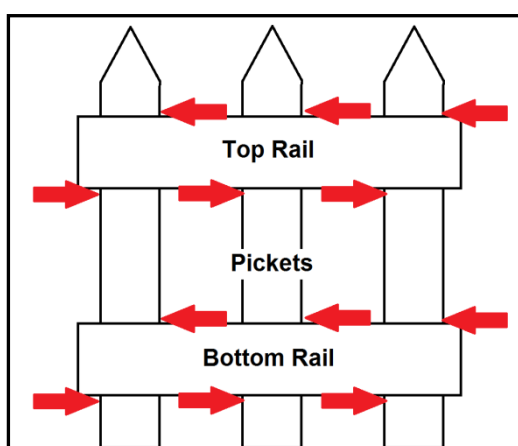
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A summary of Steel Grade C250 chemical composition, as per AS 1450, is below:

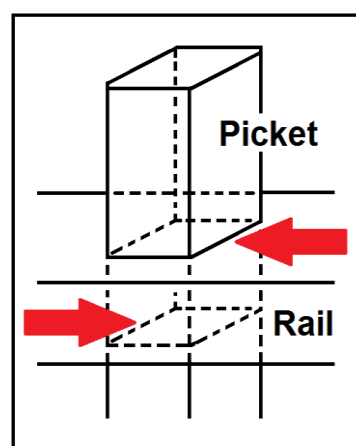
Grade Designation	Type of Analysis	Chemical composition, percent maximum					
		C	Si	Mn	P	S	Carbon equivalent
C250	Cast	0.25	0.40	-	0.040	0.040	0.44
	Product	0.29	0.45	-	0.050	0.050	-

3.1.1 Other Information

- Vertical pickets are to be welded on alternative sides of the top and bottom of both rails, with silicon bronze wire (i.e. four welds per picket), as per the diagrams below:



Picture 3.2: Picket Welding 2D view



Picture 3.3: Picket Welding 3D view

- All welds to be fully rust-proofed and finished to match the fence colour. Finished panels must be fully powder coated to meet the requirements as detailed in [Section 2.1: Pre-Treatment and Coating](#).
- Where the ground clearance exceeds 150mm, the panels are to be stepped or raked to achieve the foregoing level of clearance (If panels are to be raked, this will be specified in the relevant Scope of Works for each project).
- Stepped panels must be a minimum length of 1200mm, unless requested in the Scope of Works for special circumstances. After stepping or raking, in-fills are to be fitted rigidly beneath panels where the ground clearance still exceeds 150mm. Where in-fills are to be installed at designated waterways, and the installation will significantly obstruct the natural flow of water, alternative options are to be sought in consultation with the Project Coordinator.

3.1.2 Panel Fittings

- Panel rails are to be fixed to posts with shrouds. Shrouds are to be equipped with four (4) holes. Shrouds are to be approved by Project Co-ordinator.
- Each shroud is to be affixed to posts with four (4) colour matching self-drilling anti tamper class three screws.
- The rail is to be fixed to the shroud with one (1) colour matching self-drilling anti tamper class three screw.

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Panel Fittings cont.

- Fixings are to be on the inside of the fence, where possible, unless prevented by bracket positioning.
- Where changes of direction are not 90°, the bracket is to be constructed to suit the angle, and the sleeve is to be purposely made at the required mitre from matching powder coated material.
- Brackets and sleeves must be powder coated to match finished panels and posts to meet the requirements detailed in [Section 2.1: Pre-Treatment and Coating](#).
- Any signs required on the fence should be affixed directly under the top rail.

3.2 Type 1 Security Fencing - Posts

Manufacture	Galvanised steel tubing, in accordance with AS 1163 and AS 1397, to a steel Grade of C350 (Summary of C350 below)
Measurements (Straight line Posts)	75mm x 75mm x 3mm thickness x 3000mm in length
Measurements (Corner Posts)	100mm x 100mm x 4mm thickness x 3000mm in length
Height	<ul style="list-style-type: none"> • A minimum standard of 2100mm above ground (heights above this level will be requested on an as required basis) • The top of each post must be higher than the top of either of the adjoining fence panels
Post Cap	Matching galvanised steel cap to conform with AS 1450 and AS 1397, secured to the top of the fence post using a colour matching self-drilling anti tamper class three screw.
Post Footings	<ul style="list-style-type: none"> • 250mm minimum diameter with concrete footings not less than 20Mpa in strength. Requirements for footing depths are detailed in Section 3.6: Type 1 Security Fencing Post Footings • Above ground concrete finishes are to be domed with a steel trowel finish, to eliminate water lying at the base of posts. Doming of concrete at base of posts must be performed at the time of the original concrete pour
Post Spacing	2400mm minimum, 2500mm maximum
Coating	Fully powder coated to meet the requirements as detailed in Section 2.1: Pre-Treatment and Coating

A summary of Steel Grade C350 chemical composition as per AS 1450 is below:

Grade Designation	Type of Analysis	Chemical composition, percent maximum					Carbon equivalent
		C	Si	Mn	P	S	
C350	Cast	0.22	0.50	1.60	0.040	0.040	0.49
	Product	0.26	0.55	1.70	0.050	0.050	-

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3.3 Type 1 Security Fencing – Gates (Hinged)

Manufacture	Steel pickets and rails, manufactured from galvanised steel tubing, in accordance with AS 1450 and AS 1397 to a steel Grade of C250
Sizes	As outlined in Section 2.3: General Requirements for Gates .
Measurements	<ul style="list-style-type: none"> • 50mm x 50mm x 3mm thickness square box section vertical stiles • 50mm x 50mm x 3mm thickness square box section horizontal rails • 25mm x 25mm x 1.6mm thickness vertical pickets to match panels
Height	A minimum standard of 2100mm (heights above this level will be requested on an as required basis)
Number of Rails	<ul style="list-style-type: none"> • Three (3) total • Twin bottom 50mm square box section rails are to be fitted to bottom of the gate to provide reinforcing.
Rails Measurements	50mm x 50mm x 3mm thickness square box section horizontal rails
Top Rail Position	200mm - 270mm from the top of pickets
Rail Centres	<ul style="list-style-type: none"> • 1690mm – 1700mm (dependant on height of picket above rail) from top to middle rail • The gap between the two bottom parallel rails is not to exceed 100mm
Pickets	25mm x 25mm x 1.6mm in thickness x 2100mm in length, punched through 50mm square x 3mm rails, and welded on alternative sides of the top and middle rails, and also either side of the picket on the bottom rail, with silicon bronze wire
Picket Spacing	A standard of 125mm between picket centres, and 115mm between picket centres for preparatory (Prep) area fencing (115mm picket gaps may also be requested on an as required basis)
Picket Tops	Cut and pressed (crimped) to form a spear point top. Spear tops are to be made from the same piece of steel tubing as the picket and not attached after manufacture.
Hinges	Hinges considered under industry norms as suitable for the type of fence and gate being installed, and are to be approved by the Project Coordinator.
Welding	<ul style="list-style-type: none"> • Vertical pickets are to be punched through the top and middle rails, and welded on alternative sides of the top and bottom of the top and middle rails with silicon bronze wire (as per diagrams 3.1 and 3.2) • Pickets are not required to be punched through the bottom rail but are to meet flush with the rail and welded either side of the picket. Each picket shall have a total of six welds
Ground Clearance	Raised off of the ground, with a 150mm maximum clearance
Coating	Fully powder coated to meet the requirements as detailed in Section 2.1: Pre-Treatment and Coating
Fittings	Requirements for slide bolts, flag bolt lugs and lock boxes are detailed below in Section 3.3.2: Gate Fittings

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3.3.1 Other Information

- All gates are to be constructed to enable the gates to be locked in the fully open and/or closed position with padlocks (Project Coordinator to confirm required lock size and style).
- Ground sleeves ('Cow-bell' style brackets) are to be installed for the security of drop bolts with the gates in the open and closed position, to eliminate any tripping hazards.
- All gates are to be fitted with 20mm slide bolts and Broadhurst lock boxes and padlocks to each securing point. These locks and bolts are to be supplied by the contractor. Abus 83/50 series padlocks or equivalent are to be used. Shackle-less padlocks are to be fitted to all slide bolts. The slide bolt should be fitted internally, immediately above the parallel centre.
- There is to be no diagonal bracing on gates.

3.3.2 Gate Fittings

- Double gates are to have internal flag bolts or similar locking mechanism no less than 1200mm in length from the bottom of each individual gate. Steel tags are to be welded to the gate to accommodate the flag bolt when in the open and closed position through passing a padlock through the flag.
- Flag bolts or similar locking mechanisms are to have a 20mm diameter steel bar.
- Flag bolt lugs are to be elongated in height and to be bolted to the closing post. Locking lugs are to be welded to the frame to accommodate the flag bolt in the closed position.
- Perforated metal is to be affixed against the gate stile. This must be designed specifically to stop access to the locking mechanism from outside the gate. In cases where dual access is required a portion of the perforated metal will be cut in proximity to the locking device to allow hand access (i.e. access through double gates for emergency service personnel). The cut edges of perforated panels are to be finished to remove any sharp edges.

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3.4 Type 1 Security Fencing - Gate Posts

Manufacture	Galvanised steel tubing, in accordance with AS 1163 and AS 1397, to a steel Grade of C350
Measurements (Gates up to five (5) metres)	100mm x 100mm x 4mm thickness x 3000mm in length
Measurements (Gates over five (5) metres)	150mm x 150mm x 5mm thickness x 3000mm in length
Height	A minimum standard of 2100mm above ground (heights above this level will be requested on an as required basis)
Post Cap	Matching galvanised steel cap to conform with AS 1450 and AS 1397, secured to the top of the fence post using a colour matching self-drilling anti tamper class three screw.
Post Footings	<ul style="list-style-type: none"> • 450mm minimum diameter with concrete footings not less than 20Mpa in strength. Requirements for the depth of post footings are detailed in Section 3.6: Type 1 Security Fencing Post Footings • For pedestrian use gates, a concrete plinth 400mm wide x 150mm depth is to be installed between gate posts • For vehicle use gates, a concrete plinth 400mm wide x 300mm depth is to be installed between gate posts • Above ground concrete finishes are to be domed with a steel trowel finish, to eliminate water lying at the base of posts. • Doming of concrete at base of posts must be performed at the time of the original concrete pour
Coating	Fully powder coated to meet the requirements as detailed in Section 2.1: Pre-Treatment and Coating

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3.5 Type 1 Security Fencing – Gates (Sliding)

Manufacture	Steel pickets and rails, manufactured from galvanised steel tubing, in accordance with AS 1450 and AS 1397 to a steel Grade of C250
Sizes	<ul style="list-style-type: none"> As outlined in Section 2.3: General Requirements for Gates. Sliding gate panels are to be a minimum of 600mm longer than the gate opening
Measurements	<ul style="list-style-type: none"> 50mm x 50mm x 3mm thickness square box section vertical stiles 50mm x 50mm x 3mm thickness square box section horizontal rails 100mm x 50mm x 3mm thickness bottom rail 25mm x 25mm x 1.6mm thickness vertical pickets to match panels
Height	A minimum standard of 2100mm (heights above this level will be requested on an as required basis)
Number of Rails	<ul style="list-style-type: none"> Three (3) total Top and middle rail are to be 50mm square x 3mm thickness box section horizontal rails 100mm x 50mm x 3mm thickness box section rail is to be fitted to the bottom of the gate to provide reinforcing
Top Rail Position	200mm - 270mm from the top of pickets
Rail Centres	<ul style="list-style-type: none"> 1690mm – 1700mm (dependant on height of picket above rail) from top to middle rail The gap between the two bottom parallel rails is not to exceed 100mm
Pickets	25mm x 25mm x 1.6mm in thickness x 2100mm in length, punched through 50mm square x 3mm rails, and welded on alternative sides of the top and middle rails, and also either side of the picket on the bottom rail, with silicon bronze wire
Picket Spacing	A standard of 125mm between picket centres, and 115mm between picket centres for preparatory (Prep) area fencing (115mm picket gaps may also be requested on an as required basis)
Picket Tops	Cut and pressed (crimped) to form a spear point top. Spear tops are to be made from the same piece of steel tubing as the picket and not attached after manufacture.
Wheels	Double bearing bottom wheels with upper nylon guide rollers.
Track	<ul style="list-style-type: none"> Galvanised steel track comprising 90mm x 6mm plate with 20mm solid rod welded on centre line, with two (2) 12mm holes 50mm in from edges at 500mm centres Track to be fixed to concrete slab with 10mm x 50mm galvanised dyna bolts Concrete slab under track to be length of gate + sliding range x 400mm x 300mm deep
Catcher Bracket/ Stopping Post	<ul style="list-style-type: none"> 100mm x 100mm x 5mm post with steel guide to accommodate impact of gate when in the open position Post is to be fixed in position with four (4) heavy duty galvanised dyna bolts which are to be anchored into a concrete footing Where necessary, the upright is to be braced to combat movement caused through constant impact

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Type 1 Security Fencing – Gates (Sliding) cont.

Coating	Fully powder coated to meet the requirements as detailed in Section 2.1: Pre-Treatment and Coating
Fittings	Requirements for slide bolts, flag bolt lugs and lock boxes are detailed below in Section 3.5.1: Other Information

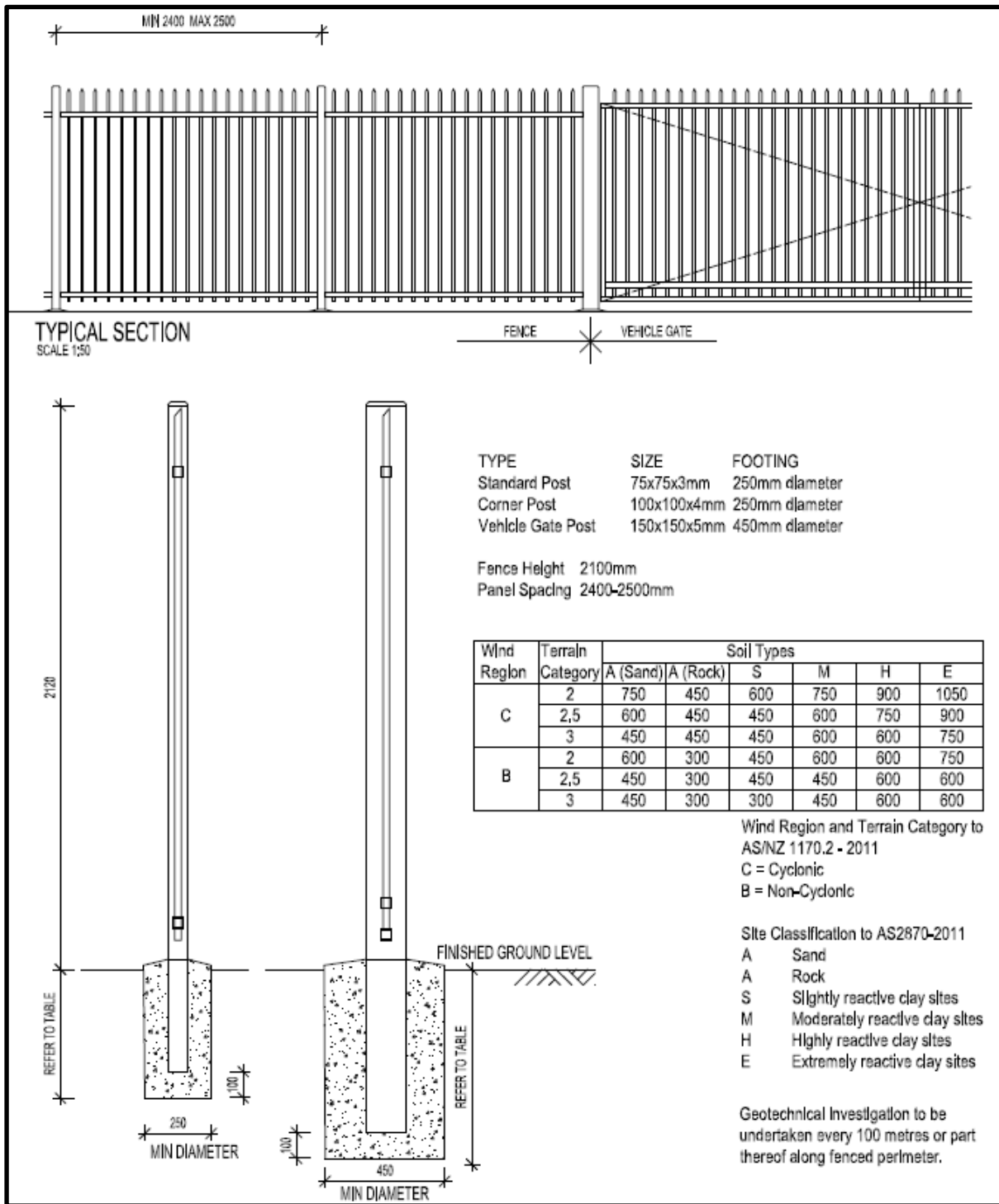
3.5.1 Other Information

- Vertical pickets are to be punched through the top and middle rails, and welded on alternative sides of the top and bottom of the top and middle rails with silicon bronze wire (as per diagrams [3.1 and 3.2](#))
- Pickets are not required to be punched through the bottom rail but are to meet flush with the rail and welded either side of the picket. Each picket shall have a total of six welds
- A 40mm x 10mm x 50mm lug is to be welded with a 20mm hole to secure the gate in the open and closed position.
- There must be a slot in the catcher bracket to receive the lug welded on the gate.
- The lug is to be constructed to accommodate a padlock (Project Coordinator to confirm required size and style of locks).
- Sliding gates are to be guided through a minimum of two (2) 'U frames' comprising 100mm x 100mm x 4mm posts.
- Posts are to be secured in place with a 5mm (minimum) steel bracing plate, coated to meet the requirements as detailed in [Section 2.1: Pre-Treatment and Coating](#).
- There is to be no diagonal bracing on gates.

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3.6 Type 1 Security Fencing – Post Footings

- Requirements for the depth of Type 1 Security Fencing post footings are dependent on:
 - The Wind Region and Terrain Categories of the project location, as per AS 1170.2-2011, Structural Design Actions – Wind actions;
 - The Site Classification of the soil type of the project location as per AS2870-2011, Residential Slabs and Footings.
- Requirements for post footing depths are outlined in the table as part of the diagram below:



Picture 3.4: Post footing requirements for Type 1 Security Fencing

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Section 4 – Type 2 Security Fencing

Type 2 Security Fencing is constructed from chain-link fabric, used predominantly for (but not exclusive to) areas where the school shares a boundary line with private property.



Picture 4.1: A standard Type 2 Security Fence

4.1 Type 2 Security Fencing – Summary

Manufacture (Posts and Rails)	Galvanised steel pipe, in accordance with AS 1725.1 and AS 1163 to a steel Grade of C250
Manufacture (Chain Link)	Steel wire manufactured from hot-rolled carbon steel rods of chemical compositions in accordance with AS 1442, protected against corrosion by application of a metallic coating during manufacture in accordance with AS 2423
Height	A minimum standard of 2100mm (heights above this level will be requested on an as required basis)
Panel Length	2400mm minimum and 2500mm maximum
Chain Link Fabric Measurements	<ul style="list-style-type: none"> Galvanised steel wire 3.15mm diameter, 50mm pitch in accordance with AS 1725 and AS 2423 Black PVC coated 4.15mm diameter, 50mm pitch may be requested on an as required basis (PVC is to be applied over galvanised steel wire)
Support Cables	4mm diameter helicoil in the same coating quality as the chain link fabric
Tie Wires and Clips	<ul style="list-style-type: none"> 2mm diameter in the same coating quality as the chain link fabric Ties wires are required for intermediate posts every 4 links at a minimum Every second chain link diamond on top rail and every second chain link diamond on bottom rail are to be individually secured using double wrapped tie wire. Continuous lacing is not acceptable At the end posts and gateposts every chain link diamond is to be individually secured using double wrapped tie wire to end posts, internal corner posts and gateposts Chain link fabric is to be clipped to the helicoil wire with no less than 2x clips per panel
Top Rail	<ul style="list-style-type: none"> Chain link fabric is to be finished with barbed top selvedge and knuckled bottom selvedge The barb is to be above the top rail

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Type 2 Security Fencing – Summary cont.

Ground Clearance	The space between the bottom selvedge of the chain link fabric and the ground is to clear the ground surface as ground contours allow, and be small enough to sufficiently maintain security.
Coating	<ul style="list-style-type: none"> The galvanised (zinc) coating on the steel pipes is to comply with AS/NZ 4792 Where powder coating is requested for posts, coating is to be applied as specified in Section 2.1: Pre-Treatment and Coating

A summary of Steel Grade C250 chemical composition, as per AS 1450, is below:

Grade Designation	Type of Analysis	Chemical composition, percent maximum					
		C	Si	Mn	P	S	Carbon equivalent (See note)
C250	Cast	0.25	0.40	-	0.040	0.040	0.44
	Product	0.29	0.45	-	0.050	0.050	-

4.1.1 Other Information

- All fittings are to be colour matched as per the request for each project.
- All items welded or cut must be primed, followed by galvanising or black paint as required for the project.
- All fittings, including nuts and bolts, are to be cut to stop removal.
- Chain link fabric is to be placed on the outside of posts and strained taut and secured to each support cable, all rails, all posts and bracing rails with tie wires, except at the end posts and gateposts
- Every second chain link diamond on top rail and every second chain link diamond on bottom rail are to be individually secured using double wrapped tie wire. Continuous lacing is not acceptable
- Chain link fabric is to be placed on the outside of posts and strained taut, secured to each support cable, all rails, all posts and bracing rails with tie wires, except at end posts and gateposts
- At the end posts and gateposts, the every chain link diamond is to be individually secured using double wrapped tie wire to end posts, internal corner posts and gateposts
- If bracing rails, bracing stays and back stays are required they are to be provided without joints, and are to be 32mm extra light nominal bore
- All rails are to be securely connected to posts with an industry approved galvanised steel clamp.

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4.2 Type 2 Security Fencing – Posts

Manufacture	Galvanised steel pipe, in accordance with AS 1725.1 and AS 1163 to a steel Grade of C250
Measurements	<ul style="list-style-type: none"> • Corner posts are to be galvanised steel pipe DN50 • Intermediate posts are to be galvanised steel pipe DN40 • Single gate posts are to be galvanised steel pipe DN50 • Double gate posts are to be galvanised steel pipe DN80 • Top rails are to be galvanised steel pipe DN32 • Bottom rails are to be galvanised steel pipe DN32
Height	A minimum standard of 2100mm above ground (heights above this level will be requested on an as required basis)
Footings (Intermediate Posts)	<ul style="list-style-type: none"> • 250mm minimum diameter not less than 20Mpa in strength. Requirements for the depth of post footing are detailed in Section 4.4: Type 2 Security Fencing Post Footings • Above ground concrete finish is to be domed with steel trowel finish to eliminate water lying at base of posts and is to be completed at time of original concrete pour
Footings (Corner Posts)	<ul style="list-style-type: none"> • 250mm minimum diameter x 750mm minimum depth with not less than 20Mpa in strength • Above ground concrete finish is to be domed with steel trowel finish to eliminate water lying at base of posts and is to be completed at time of original concrete pour

4.2.1 Other Information

- Ends of the support cable wire are to be firmly secured to all terminal posts.
- If a top rail is specified as not to be used, then the top support cable is to be positioned one half-diamond below the top selvedge of the chain link fabric.
- The bottom support cable is to be positioned not more than one diamond above the bottom selvedge of the chain link fabric.
- Knotted joins in cable wire are not permitted.

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4.3 Type 2 Security Fencing - Gates

Manufacture (Posts and Rails)	Galvanised steel pipe, manufactured in accordance with AS 1725.1 and AS 1163 to a steel Grade of C250
Manufacture (Chain Link)	Steel wire manufactured from hot-rolled carbon steel rods of chemical compositions in accordance with AS 1442, protected against corrosion by a metallic coating applied during manufacture in accordance with AS 2423
Sizes	As outlined in Section 2.3: General Requirements for Gates .
Height	<ul style="list-style-type: none"> • A minimum standard of 2100mm (heights above this level will be requested on an as required basis) • The height of the gate is to match the height of the fence (allowing for sufficient minimum ground clearances)
Frame	Gate outer frame to be constructed of DN25 and inner frame of DN20. Design to be in accordance with AS 1725.1.
Posts	<ul style="list-style-type: none"> • Corner posts are to be galvanised steel pipe DN50 • Intermediate posts are to be galvanised steel pipe DN40 • Single gate posts are to be galvanised steel pipe DN50 • Double gate posts are to be galvanised steel pipe DN80 • Top rails are to be galvanised steel pipe DN32 • Bottom rails are to be galvanised steel pipe DN32
Chain Link Fabric Measurements	<ul style="list-style-type: none"> • Galvanised steel wire 3.15mm diameter, 50mm pitch in accordance with AS 1725 and AS 2423 • Black PVC coated 4.15mm diameter, 50mm pitch may be requested on an as required basis (PVC is to be applied over galvanised steel wire) • Chain link fabric applied to gates is to match the fabric on the fence
Support Cables	4mm diameter helicoil in the same coating quality as the chain link fabric
Tie Wires and Clips	<ul style="list-style-type: none"> • 2mm diameter in the same coating quality as chain link fabric • Ties wires required for intermediate posts at minimum every 4 links • Every second chain link diamond on top rail and every second chain link diamond on bottom rail are to be individually secured using double wrapped tie wire. Continuous lacing is not acceptable • At the end posts and gateposts every chain link diamond is to be individually secured using double wrapped tie wire to end posts, internal corner posts and gateposts • Chain link fabric is to be clipped to the helicoil wire with no less than 2x clips per panel
Top Rail	<ul style="list-style-type: none"> • Chain link fabric is to be finished with barbed top selvedge and knuckled bottom selvedge • The barb is to be above the top rail
Ground Clearance	The space between the bottom selvedge of the chain link fabric and the ground is to clear the ground surface as ground contours allow, and be small enough to sufficiently maintain security.
Drop Bolt	A flag drop bolt or similar locking mechanism made from a 16mm diameter, galvanised steel pin, is to be installed no less than 1200mm in length from the bottom of each individual gate
Coating	<ul style="list-style-type: none"> • Where powder coating is requested for posts, coating is to be applied as specified in Section Section 2.1: Pre-Treatment and Coating

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4.3.1 Other Information

- The chain link fabric is to be tied individually to the gate frame on every chain link diamond to gate frame and along the internal bracing.
- All joints are to be fully welded, staggered welding is not acceptable.
- Two coats of approved zinc-rich paint are to be applied to all galvanised surfaces damaged by welding.
- Brackets are to be fitted to each double-leaf gate for the provision of locking the gates.
- Galvanised 'cowbell' brackets are to be provided at ground level, to hold the gates in both the open and closed position. The devices should be installed as to not present a trip hazard.
- Doming of concrete is to be sufficiently high enough to prohibit the ingress of dirt and is to be painted yellow to indicate possible trip hazard.
- Locking lugs are to be welded to the frame to accommodate the flag bolt being secured in the 'cowbell bracket' in the closed position.
- Flag bolts or similar locking mechanisms are to have a 20mm diameter steel bar.
- Gate hinges are to be heavy duty, and secured to prohibit removal of the gate.
- Gates are to open 180 degrees and lock back against fence line where ground contours allow.

4.3.2 Base plates

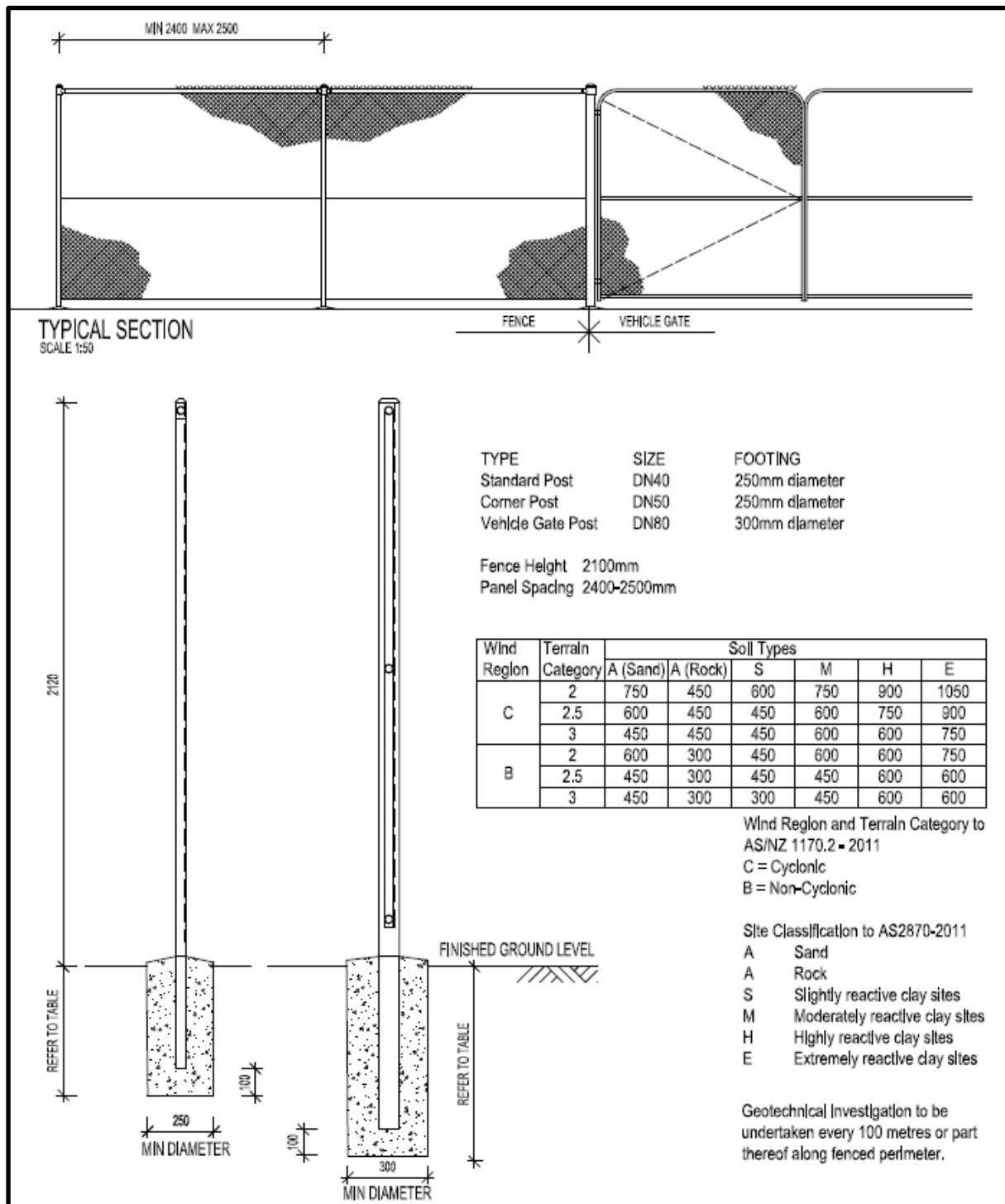
- Base plates can be installed where suitable concrete pavement or similar surfaces are available.
- When a base plate is installed, the base plates are to be fixed with four (4) heavy duty galvanised dyna bolts to the concrete.
- Posts are to be fully secured with the bolt nuts welded or burred to prevent removal.

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4.4 Type 2 Security Fencing – Post Footings

- Requirements for the depth of Type 2 Security Fencing post footings are dependent on:
 - The Wind Region and Terrain Categories of the project location, as per AS 1170.2-2011, Structural Design Actions – Wind actions;
 - The Site Classification of the soil type of the project location as per AS2870-2011, Residential Slabs and Footings.

Requirements for post footing depths are outlined in the table as part of the diagram below:



Picture 4.2: Post footing requirements for Type 2 Security Fencing

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Section 5 – Type 3 Security Fencing

Type 3 Security Fencing Fencing constructed from welded wire mesh, used predominantly (but not exclusive to) for areas not visible to the general public, for example near creeks or in rural areas, including sporting and agricultural areas.



Picture 5.1: A standard Type 3 Security Fence

5.1 Type 3 Security Fencing - Summary

Manufacture	Continuous welded galvanised steel wire mesh panels, with two (2) horizontal presses, foiled base and spiked tops, in accordance with AS 2423
Mesh	5mm diameter steel wire, with 50mm horizontal spacing x 75mm vertical spacing, welded at each crossover point
Height	A minimum standard of 2100mm (heights above this level will be requested on an as required basis)
Length	<ul style="list-style-type: none"> • 2400mm • Smaller panel lengths may be requested where ground clearance exceeds acceptable levels due to ground contours
Fittings	All panels are to be fitted with U clips, total number to be determined by total height of panel/s and predrilled holes in posts
Ground Clearance	Clearing the ground surface, but small enough to sufficiently maintain security
Coating	Panels are to be galvanised after manufacture to meet the requirements as detailed in Section 2.1: Pre-Treatment and Coating

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5.2 Type 3 Security Fencing -Posts

Manufacture	Galvanised steel Rectangular hollow section (RHS) posts, in accordance with AS2423
Measurements (For up to 2400mm height)	50mm nominal bore /60.3mm outside diameter, with a wall thickness of 3.6mm
Measurements (For over 2400mm height)	80mm nominal bore /88.9mm outside diameter, with a wall thickness of 4mm
Height	A minimum standard of 2100mm above ground (heights above this level will be requested on an as required basis)
Post Cap	Matching galvanised steel cap to conform with AS 1450 and AS 1397, secured to the top of the fence post using a colour matching self-drilling anti tamper class three screw.
Footings	250mm minimum diameter not less than 20Mpa in strength. Requirements for the depth of footings are detailed in Section 5.4: Type 3 Security Fence Post Footings
Fittings	<ul style="list-style-type: none"> • Galvanised U clips must be fastened to posts at each predrilled hole • Hexagonal head galvanised bolts and nuts are to be: <ul style="list-style-type: none"> ○ M8 x 90mm for 50mm NB posts ○ M8 x 100mm for 80mm NB posts
Coating	Posts are to be galvanised after manufacture in accordance with AS 4792 and to meet the requirements as detailed in Section 2.1: Pre-Treatment and Coating

- Each post can be drilled with 11-14 x 10mm holes, dependent upon the total height of combined panels, and must include a hole to enable stepping of panels where necessary

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5.3 Type 3 Security Fencing - Gates

Manufacture	Continuous welded galvanised steel wire mesh panels, with two (2) horizontal presses, foiled base and spiked tops, in accordance with AS 2423
Frame	32mm nominal bore galvanised steel pipe frame and internal bracing. Spike top is to protrude 50mm above the top of the gate frame, level with top of the gate stile
Mesh	5mm diameter steel wire, with 50mm horizontal spacing x 75mm vertical spacing, welded at each crossover point
Sizes	As outlined in Section 2.3: General Requirements for Gates
Height	<ul style="list-style-type: none"> • A minimum standard of 2100mm (heights above this level will be requested on an as required basis) • The height of the gate is to match the height of the fence (allowing for sufficient minimum ground clearances) with a spiked top
Posts	Galvanised steel PHS posts, 100mm nominal bore/ 114.3mm outside diameter, with a wall thickness of 4.5mm
Post Cap	Matching galvanised steel cap to conform with AS 1450 and AS 1397, secured to the top of the fence post using a colour matching self-drilling anti tamper class three screw.
Fittings	Hexagonal head galvanised bolts and nuts are to be M8 x 150mm for 100mm NB posts
Hinges	Galvanised steel hinges that are bolted or welded to the posts
Ground Clearance	The gate is to clear the ground surface, but be as close to the ground as possible
Drop Bolts	Requirements for drop bolts are described below
Coating	Gates are to be galvanised after manufacture in accordance with AS 4792 and to meet the requirements as detailed in Section 2.1: Pre-Treatment and Coating

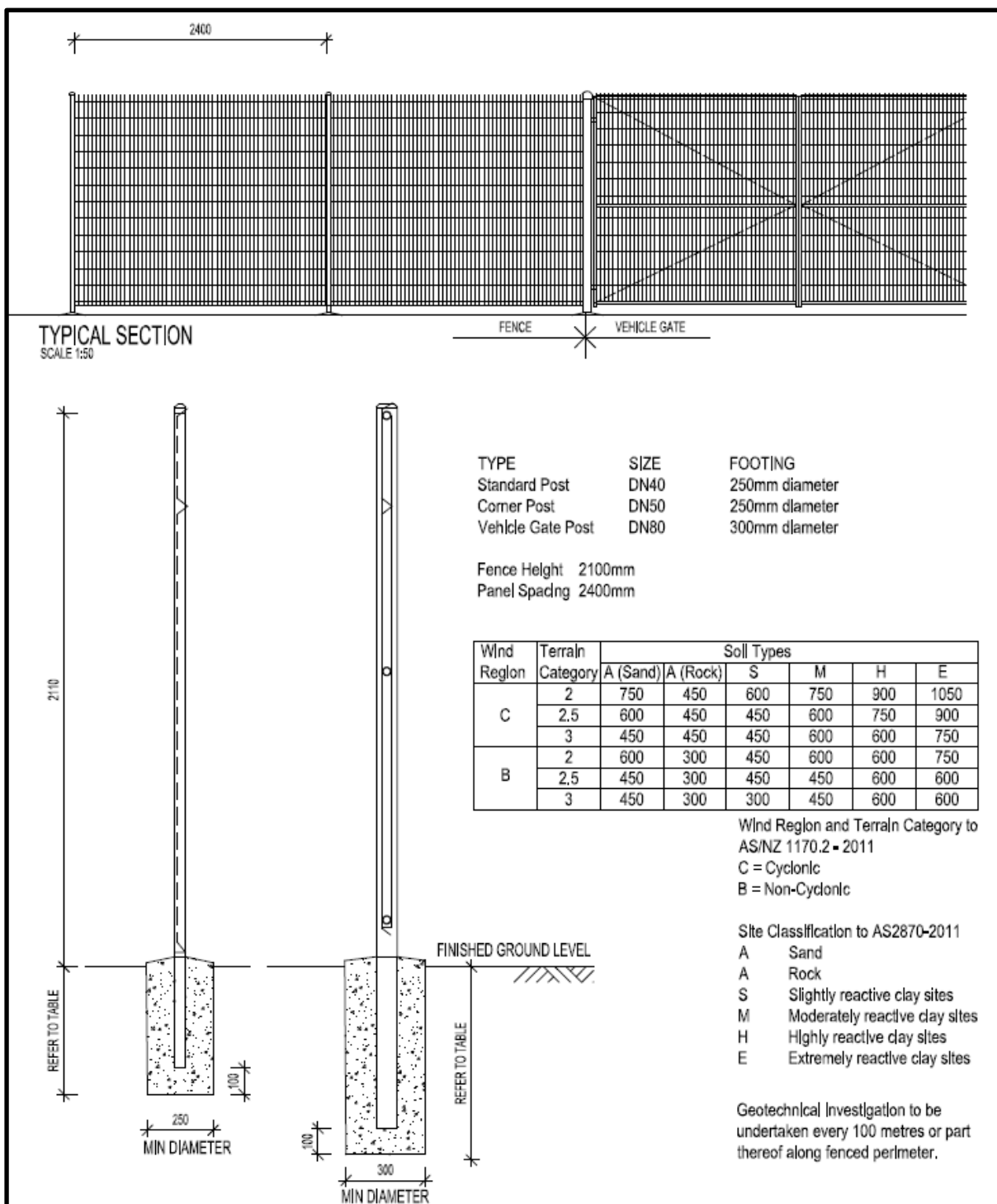
- Each leaf is to have a 32mm nominal bore galvanised steel internal stile between the middle and bottom rails. There is to be a 100mm space with no mesh from the closing stile, to allow external access to the drop bolt and lock.
- Gates must have an internal Broadhurst or similar protected/encased locking mechanism and a hand hole 1500mm from the bottom of the gate.
- The protected/encased locking mechanism is to be fitted with a 20mm diameter steel bar and two lugs, or one lug of sufficient width, bolted to the closing post to receive the shot bolt, preventing the gates opening when the drop bolts are not secured.
- Weldmesh infill is to remain over hand hole.
- Gates are to be equipped with an 850mm lockable drop bolt.
- Flag bolts or similar locking mechanisms are to have a 20mm diameter steel bar.
- Where it is not possible to engage the drop bolt to the ground level then provision is to be made for the installation of an 1800mm galvanised steel post, measuring 65mm x 65mm x 2.5mm.
- The slide bolt is to be lockable in both the open and closed position.
- Gates are to open 180 degrees and lock back against fence line where ground contours allow.

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5.4 Type 3 Security Fencing – Post Footings

- Requirements for the depth of Type 2 Security Fencing post footings are dependent on:
 - The Wind Region and Terrain Categories of the project location, as per AS 1170.2-2011, Structural Design Actions – Wind actions;
 - The Site Classification of the soil type of the project location as per AS2870-2011, Residential Slabs and Footings.

Requirements for post footing depths are outlined in the table as part of the diagram below:



Picture 5.2: Post footing requirements for Type 3 Security Fencing

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Section 6 – Images



Picture 6.1: Type 1 Security Fencing Sliding Gate



Picture 6.2: Mesh infill panel fixing on a Type 1 Security Fence

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Picture 6.3: Type 1 Security Fencing with infill bar



Picture 6.4: Type 1 Security Fencing with infill bar

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Picture 6.5: Signs correctly affixed to Type 1 Security Fencing