

Quasar Management Services Pty Ltd

Incorporated in NSW ABN 21 003 954 210
49A Parklands Road, Mt Colah NSW 2079, Australia
p: +61 2 9482 5750 www.electronicblueprint.com.au
f: +61 2 4360 2256 rod@electronicblueprint.com.au



Professional Engineers Opinion Fences Constructed of Prestige Rendex EPS System and Posts

Certification

I certify that fences and privacy walls complying with the tables and drawings below will meet the requirements of the National Construction Code, in accordance with:

- current standards of good industry practice, based on Concrete Masonry Association of Australia manuals;
- principles of structural mechanics for strength, stability and serviceability;
- current versions of the relevant Australian Standards listed below
 - AS/NZS 1170.2 Structural design actions – Part 2 Wind loads
 - AS 4055 Wind loads for housing
 - AS 4678 *Earth Retaining Structures*
- Specific wind loads and soil properties for the specific project as provided by structural design engineer responsible for the specific project.

The scope of this design does not include:

- site inspection,
- determination of site parameters or particular wind loadings,
- drainage assessment,
- determination of the soil properties, or
- other geotechnical assessment.

The design information referred to in this certificate is for use by a qualified and experienced civil engineer, with the authority and responsibility for the design and construction of the particular fences or privacy walls.

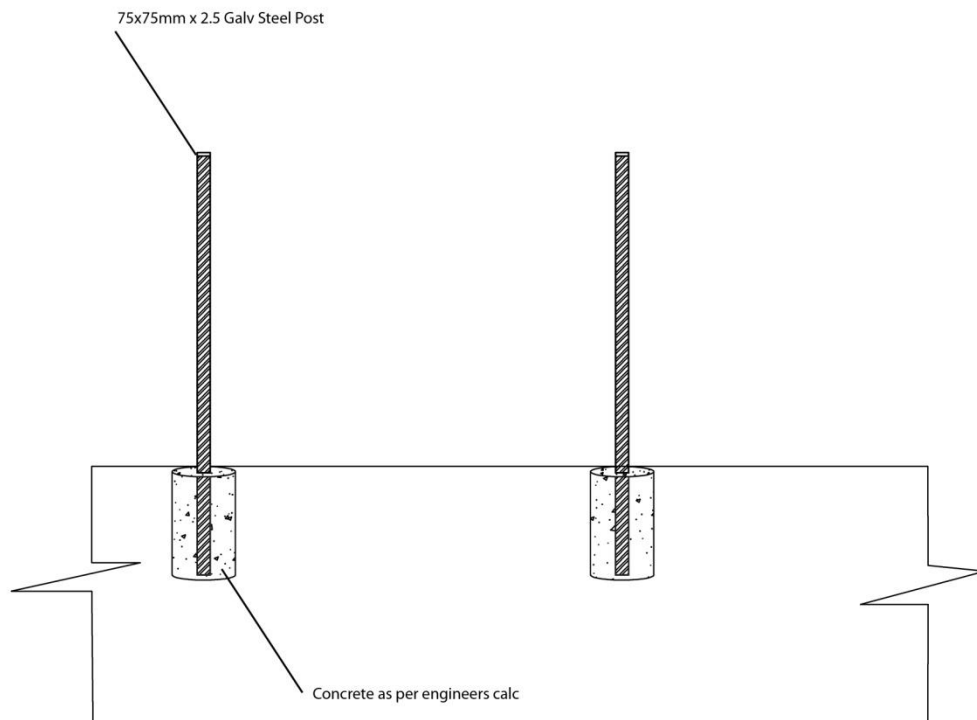
System Description

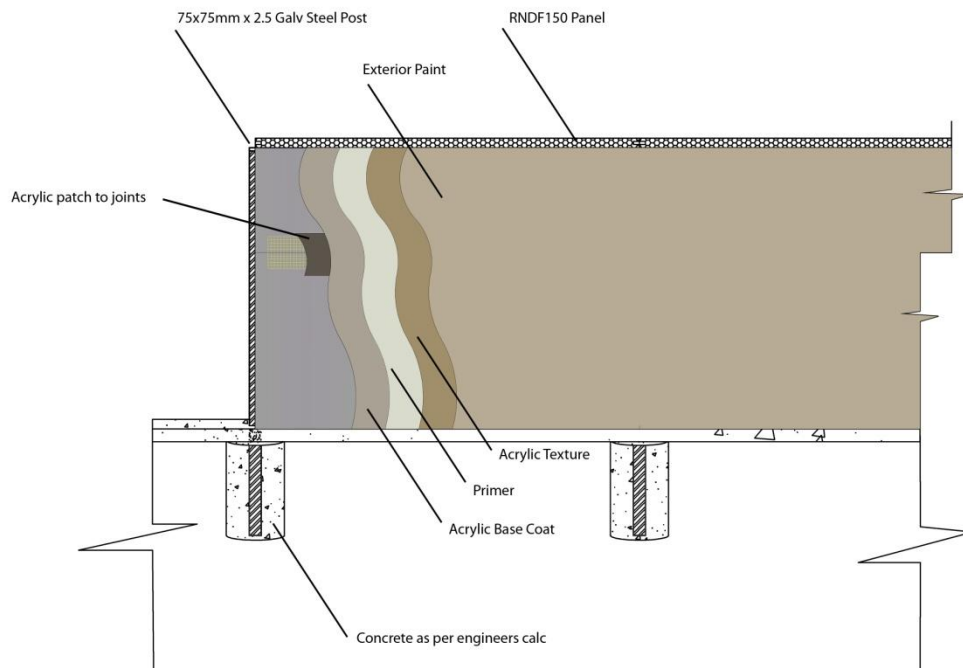
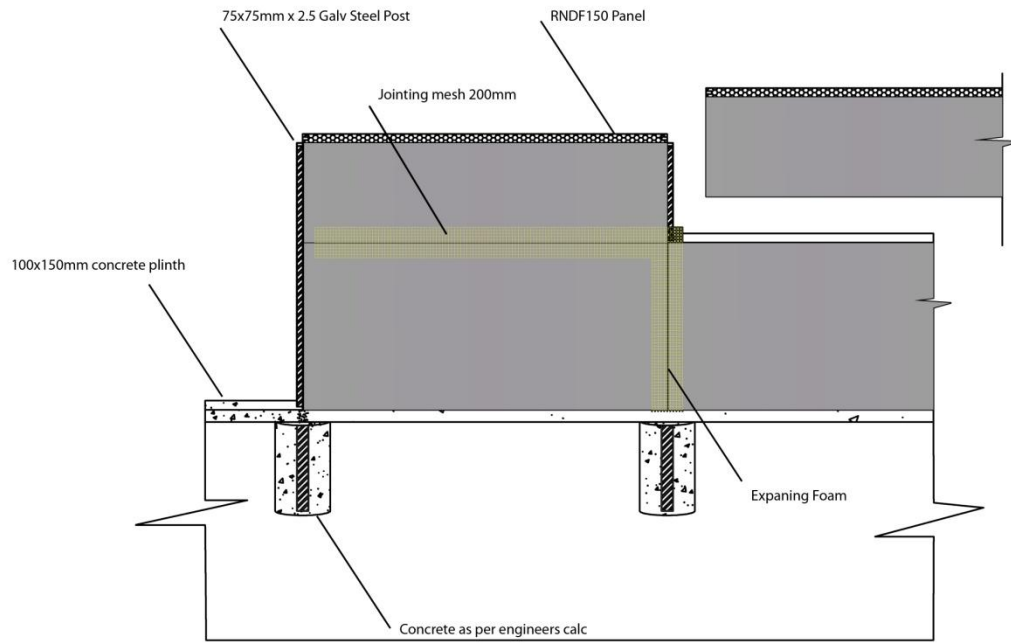
Fences and privacy walls constructed of Prestige Rendex EPS System and steel posts set in concrete piers in accordance with the following tables and drawings, and the manual:

Rendex Modular Lightweight Fencing – July 2012

Panels shall be 150 mm thick Class M expanded polystyrene with 160 g/m² fibre reinforcement to both sides.

Required Depth of 450 mm Diameter Piers at 2.4 m centres For Free-Standing Privacy Walls and Fences							
Pier spacing, m	Soil friction, °	Height, m	Required Depth of Piers Wind Classifications, m				
B	ϕ	H	N1 _f	N2 _f	N3 _f C1 _f	N4 _f C2 _f	N5 _f C3 _f
2.4	25	2.4	1.26	1.44	1.71	1.98	2.34
		2.1	1.17	1.34	1.59	1.84	2.17
		1.8	1.07	1.22	1.45	1.68	1.99
	30	2.4	1.17	1.33	1.58	1.84	2.17
		2.1	1.08	1.24	1.47	1.7	2.01
		1.8	0.99	1.13	1.35	1.56	1.84
	35	2.4	1.08	1.24	1.47	1.7	2.01
		2.1	1	1.15	1.36	1.57	1.86
		1.8	0.92	1.05	1.25	1.44	1.7





Deemed-to-Satisfy Solution

This Professional Engineer's Certificate provides an assessment of the system described, evaluated against the Deemed-to-Satisfy solutions in BCA Volume One and BCA Volume Two Part 3.12 for fire resistance.

Professional Engineer Qualifications and Experience

The qualifications and experience of the certifying engineer are set out in the Appendix, and satisfy the requirements for a Professional Engineer as defined in BCA Volume One Part A1.1 and BCA Volume Two Part 1.1.1.2.

Validity

This Professional Engineer's Certificate is valid for the shortest of the following periods:

- A period of ten years from the date of publication; or
- Until superseded by more recent technical information or by other certification, such as CodeMark third-party certification; or
- Until the particular referenced parts of the BCA are superseded in the BCA or in State and territory Building Regulations.¹; or
- Until the particular referenced Standards are superseded.

Sincerely

A handwritten signature in black ink, appearing to read 'Rod Johnston', with a long horizontal line extending to the right.

Rod Johnston
B Tech, M Eng Sc, MICD, CP Eng, NPER, MIE Aust, RPEQ

¹ The BCA is reviewed annually and published 1 May of each year.

Appendix 1 - Design of Privacy Walls and Fences

Wind Loads

Wind loads on free-standing EPS privacy walls and fences should be calculated using AS/NZS 1170.2. However, designers often associate these structures with the design of houses to AS 4055. Strictly speaking, privacy walls and fences are outside the scope of AS 4055, although the nomenclature used therein is useful in classifying the wind exposure of housing sites for wind loads on such structures.

The nomenclature used in this certification for the Wind Classification for Free-Standing Privacy Walls and Fences (N1_f to N5_f, C3_f) has been adopted to differentiate it from the corresponding nomenclature, Wind Classification for Housing (N1 to N5, C3), which is set out in AS 4055 for houses. Although the resulting ultimate free stream gust dynamic wind pressures, designated q_{zu} , are the same, their derivation is different. Applications corresponding to N6 and C4 are beyond the scope of this certification.

Wind Classification for Free-Standing Fences and Walls			
Wind Classification	Design gust wind speed at height (h) V_{zu} m/s	Ultimate free-stream gust dynamic wind pressure, q_{zu} kPa	Ultimate net wind pressure on free-standing wall, p_{nu} kPa
N1 _f	34	0.69	0.83
N2 _f	40	0.96	1.15
N3 _f C1 _f	50	1.50	1.80
N4 _f C2 _f	61	2.23	2.68
N5 _f C3 _f	74	3.29	3.94
Notes			
1. Design pressure is based on an aerodynamic shape factor, C_{fig} , of 1.20.			
2. Applications corresponding to N6 and C4 are beyond the scope of this manual.			

Soil Properties

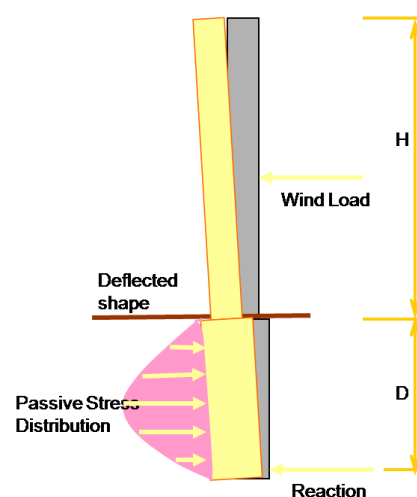
Soil properties used to determine the resistance to overturning of the piers for free-standing EPS privacy walls and fences should be based on reduction factors given in AS 4678 and "cautious estimates of the mean" density, internal friction angle and cohesion as defined in AS 4678.

Pier Resistance

The overturning resistance of piers supporting privacy walls may be based on the principles for laterally loaded "short" piles as set out in AS 2159.

The method of determining the soil lateral resistance, employed in the worked example below, is based on *Lateral Resistance on Piles in Cohesionless Soils*, by B.B. Broms (May 1964). For a single short pier in cohesionless soil, this paper suggests that the resistance be determined from the design passive resistance multiplied by a factor of 3.0 (designated k_{pier} in the example). A similar paper, *Lateral Resistance on Piles in Cohesive Soils*, by B.B. Broms (March 1964) covers cohesive soils. There are other more recent papers describing methods of varying complexity, based on tests and/or theory. However, the selected method has been chosen for its simplicity, in the context of the fact that there is relatively low risk associated with privacy walls with a maximum height of approximately 1.8 m.

The assumed distribution of pressures, resisting the overturning moments, are as shown.



Taking moments about the base of the pier of the stress distribution
 $M = K K_p \gamma b D^2 / 6$

Appendix 2 - Rod Johnston

Name Rodney Kentwell Johnston
Residential Address 80A The Scenic Road, Killcare Heights NSW 2257, Australia
Business Address 49A Parklands Road, Mount Colah NSW 2079, Australia

Qualifications and Professional Associations

Master of Engineering Science (Structural & Foundation Engineering)
Master of International and Community Development
Bachelor of Technology (Civil Engineering)
Previously Qualified Building Supervisor (NSW 18087-S)
Apprenticeship in Boilermaking
Member, Institution of Engineers, Australia (MIE Aust)
Chartered Professional Engineer (CP Eng)
National Professional Engineers Register, Membership No 377019 (NPER)
Registered Professional Engineer, Queensland (RPEQ)
Association of Consulting Structural Engineers (ACSE)
Consult Australia (Formerly ACEA)

Australian Building Codes Board

Rod Johnston represents the Association of Consulting Engineers Australia (ACEA) on the Building Codes Committee (BCC), the peak technical advisory committee to the Australian Building Codes Board, which prepares the Building Code of Australia (BCA). He therefore has an intimate knowledge of the BCA and its requirements.

Company and Association Boards

Quasar Management Services Pty Ltd - Chairman & Principal Consultant (1990 – Current)
Consulting structural and civil engineering firm, specialising in technical manuals and CodeMark for the building products, concrete, masonry, steel and retaining walls.

Design Detail Deliver Pty Ltd (Trading as Electronic Blueprint) - Chairman (2000 – Current)
Company providing web-based services in Australia and overseas, in specifications and construction details, professional training and engineering design software

Building Product Certification Pty Ltd - Chairman (2009 – Current)
Company specializing in:

- Production of design and constructions manuals for building products
- CodeMark consulting for building products
- Sustainability of building products

Partner Housing Australasia (Building) Incorporated - President (2002-Current)
Charitable home builder organization providing professional design and construction services for affordable housing in Australia and Asia-Pacific region.

Previous Board and Local Authority Positions

Habitat for Humanity Australia Inc - Director 2003-2005
Charitable home builder organization providing affordable housing throughout Australia.

Association of Consulting Structural Engineers (NSW) - Director (2004 – Current)
Professional association for consulting structural engineers, affiliated with the Association of Consulting Engineers, Australia.

Hornsby Shire Council - Councillor from 1987 to 1991. Deputy President 1990-1991
Local authority (Area 510 sq. km, approximate population 120,000, northern Sydney)

Engineering and Building Experience

From 1968 to 1981, Rod Johnston was employed in the building and construction industries in Australia, United Kingdom and Zambia in roles which included structural design engineer, draftsman, registered builder, contract controller, estimator, tradesman and industry association expert.

From 1981 to 1990, Rod Johnston was employed by Amatek Limited (formerly Monier Limited and now part of Rocla) as Project Manager, Manager Engineering and Construction and Technical Marketing Manager in the Masonry Division. During this period, duties included management of pavement and retaining wall construction, research and development for the manufacture and use of concrete masonry, coordination of university testing of masonry systems, quality assurance, technical advice to engineers, architects and builders and service on many masonry related SAA technical committees which are listed below.

For over 20 years (from 1990 to the current date), Rod Johnston has been the principal of Quasar Management Services Pty Ltd, a consulting structural and civil engineer, specializing in:

- Design of concrete, masonry and steel structures, including residential buildings and retaining walls,
- Preparation of design manuals and design aids for the engineering industry,
- Technical problem solving and expert witness
- ISO 9001 quality management systems and CodeMark appraisals (to the Building Code of Australia).

He is also principal of Electronic Blueprint, a company specialising in design and construction software, education, training and specialised building products; and Building Product Certification Pty Ltd, specialising in carrying out analyses for Environmental Product Declarations and CodeMark appraisals.

Australian Standards Technical Committees

Rod Johnston has been an active member of Standards Australia Technical Committees, preparing the following standards:

AS 2870	Residential slabs and footings
AS 4678	Earth retaining structures
AS 3700	Masonry structures
AS 4773	Draft standard for masonry in small buildings
AS/NZS 4455	Masonry units and segmental pavers
AS/NZS 4456	Masonry units and segmental pavers - Methods of test
AS 2904	Damp proof courses and flashings
AS 2701	Sampling and testing mortar
AS/NZS 2699	Built in components for masonry construction
AS 3727	Guide to residential pavements
AS/NZS 4586	Slip resistance classification of new pedestrian surfaces
AS/NZS 4663	Slip resistance classification of existing pedestrian surfaces
AS/NZS 4960	Draft standard for segmental pavements (currently being prepared)
HB 197	An introductory guide to the slip resistance of pedestrian surface materials
AS/NZS 1170	Loading standards
AS 2627.1	Thermal insulation of dwellings - Thermal insulation roofs and walls

He has served on the following committees and working groups, assisting the Australia Building Codes Board to prepare amendments to the Building Code of Australia for energy saving.

- Technical Committee (Residential)
- Technical Committee (Commercial)
- Building Fabric (Housing) WGH 5 - Chairman
- Building Fabric (Commercial Buildings) WGC 2