



New Zealand
Institute of Architects
Incorporated



Building Code Clause(s) B1, F2, F4

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance on use of Producer Statements (formerly page 2) is available at www.engineeringnz.org)

ISSUED BY: P & P CONSULTING ENGINEERS LTD
(Design Firm)

TO: BALCO LTD
(Owner/Developer)

TO BE SUPPLIED TO: VARIOUS COUNCIL
(Building Consent Authority)

IN RESPECT OF: CANTILEVER GLASS BALUSTRADES SUPPORTED BY MINI POSTS, CAPPING RAILS
(Description of Building Work)

AT: VARIOUS ADDRESS
(Address)

Town/City: LOT DP SO
(Address)

We have been engaged by the owner/developer referred to above to provide:

STRUCTURAL DESIGN

.....
(Extent of Engagement)

services in respect of the requirements of Clause(s) B1, F2, F4 of the Building Code for:

All or Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

Compliance Documents issued by the Ministry of Business, Innovation & Employment B1/VM1 or
(verification method/acceptable solution)

Alternative solution as per the attached schedule.....

The proposed building work covered by this producer statement is described on the drawings titled:

BALCO LTD FRAMELESS GLASS BALUSTRADE and numbered 17/357/minipost.DS, ENG01-ENG02
together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions REFER NOTES AT END OF DESIGN SUMMARY
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

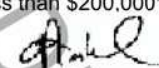
CM1 CM2 CM3 CM4 CM5 (Engineering Categories) or as per agreement with owner/developer (Architectural)

I, PARMIL PRAKASH am: CPEng 251801 # Reg Arch #
(Name of Design Professional)

I am a member of: Engineering New Zealand NZIA and hold the following qualifications: BE (Civil), CPEng

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.

The Design Firm is a member of ACENZ:

SIGNED BY: PARMIL PRAKASH (Signature) 
(Name of Design Professional)

ON BEHALF OF P & P CONSULTING ENGINEERS LTD Date: 22/11/2023
(Design Firm)

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.
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P & P CONSULTING ENGINEERS LTD

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22/11/2023

Ref: 17/357

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

B2 COMPLIANCE

Producer Statement for Design-PS1 for Clause B2 of the Building Code – Structural Durability.

We are not able to provide this because there is no effective verification method for B2 contained within the Building Code.

However we can confirm that for the structural elements shown on our documentation:

Timber

Timber treatment has been selected in accordance with Table 1A of B2/AS1.

Concrete

Concrete cover have been selected in accordance with NZS3101:2006, Part 1 Section 3.

Mild Steel

Steel protection has been specified in accordance with the “Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings” AS/NZS3212. We Note that this is on a time to first maintenance basis.

We trust this provides the information that you are seeking.

Yours faithfully,



Mr P Prakash
Director
P & P Consulting Engineers Limited

CANTILEVER GLASS BALUSTRADES TESTING
SUPPORTED BY S/S SQUARE MINI POSTS

2. TEST LOADS (square mini post)

The glass and support posts were tested to comply with the following domestic load cases taken from AS/NZS 1170.1:2002 and the DBH Practice Advisory # 10:

Occupancy Type	Refer Table 3.3 of AS/NZS 1170:	Maximum Design Loads		
A, C3 (Residential Only)	Domestic Barriers for One or More Dwellings Including Balcony Edges (NOT subject to Over Crowding)	0.75 kN/m (75 kg/m)	0.6 kN (60 kg) Anywhere	1 kPa (100 kg/m ²) Infill

3. TEST RESULTS (square mini post)

The glass setup and test results by SGS is included herewith on pages 3 & 4.

As can be seen the panel passed all the test performed by loads being 30% greater than ultimate loads.

Hence, 12 m toughened Safety Glass is sufficient.

4. WIND LOAD ASSESSMENT (square mini post)

Maximum load on whole panel was 275 kg

Based on this, the pressure is 2.0 kPa

With Basic wind pressure coefficient of 1.3, Allowable pressure = 1.5 kPa

Wind Load for "VERY HIGH" wind zone is:

$$V_z = 50.00 \text{ m/s (V600) ULS}$$

$$q \text{ (basic)} = 1.50 \text{ kPa (ULS)}$$

Hence, the panel is satisfactory for sites up to "VERY HIGH" wind zone

For Pool Fence, height = 1.2 m

Allowable pressure = $1/1.2^2 \times 1.5 \text{ kPa} = 1 \text{ kPa}$

Importance Level for Pool Fence = 1 (factor between V500/V100 = 1.2)

Hence Allowable pressure = 1.2 kPa = "HIGH" wind zone

Amended Report

This replaces previous Report no.: INZ59857-01
 dated 14/08/17.

File Ref: INZ 59857

Page 1 of 2

TEST REPORT No.: INZ59857-01A

Client: Balco
 Order No.: TBA
 Sample Description: Glass Balustrade System
 Identification: As listed below
 Material Specification: As listed below
 Tested in accordance with: Client instruction, referencing NZS 4223.3 2016

Test: Load versus displacement testing of glass balustrade system.

Method: Three glass panels were installed in line with designated fixings on SGS's glass balustrade test frame, consisting of the components listed below. The tests were carried out in accordance with the clients' instruction (Fig.1).

- Glass Panel* – 12mm toughened glass 1400mm wide by 970mm high, Item No. 12BG-1400
- Glass Fixing* – Frameless glass spigot Duplex 2205, Item No. SSA1621M5
- Guard Rail* – 5800 mm long x 25mm high x 21mm wide RHS handrail, item No. SS316L

Results:

Glass Pane Concentrated Load

Panel Section	Applied Load (kg)	Hold Time (mins)	Displacement (mm)		Comments
			Max	Perm.	
1	120	15	33.0	0.9	Glass remained intact
2	120	15	31.4	0.8	Glass remained intact
3	120	15	32.5	1.0	Glass remained intact
Average			32.3	0.9	

Glass Pane Line Load

Panel Section	Applied Load (kg)	Hold Time (mins)	Displacement (mm)		Comments
			Max	Perm.	
1	287	15	55.3	0.8	Glass remained intact
2	287	15	62.8	1.1	Glass remained intact
3	287	15	64.5	1.0	Glass remained intact
Average			60.9	1.0	

Glass Pane Uniform Load

Panel Section	Applied Load (kg)	Hold Time (mins)	Displacement (mm)		Comments
			Max	Perm.	
1	275	15	12.8	0.1	Glass remained intact
2	275	15	14.2	0.1	Glass remained intact
3	275	15	14.2	0.1	Glass remained intact
Average			13.7	0.1	

Top Rail Concentrated Load

Panel Section	Applied Load (kg)	Hold Time (mins)	Displacement (mm)		Comments
			Max	Perm.	
1	80	15	48.3	0.0	No deformation of top rail
2	80	15	50.1	0.3	No deformation of top rail
3	80	15	49.7	0.1	No deformation of top rail
Average			49.4	0.1	

TEST REPORT No.: INZ59857-01A

Panel Section	Applied Load (kg)	Hold Time (mins)	Displacement (mm)		Comments
			Max	Perm.	
1	190	15	74.3	0.3	No deformation of top rail
2	190	15	80.6	0.1	No deformation of top rail
3	190	15	81.2	0.0	No deformation of top rail
Average			78.7	0.1	

- Note: 1. Displacement sensor positioned behind panel in-line with concentrated and at midpoint of line and uniform loading.
 2. All fixings installed on steel structure with testing conducted on centre panel.
 3. Centre glass pane removed to conduct testing on top rail.

REQUIRED TEST LOADS	LOAD POSITION
CONCENTRATED LOAD (PANEL) = 120kg	Pane Top corner
LINE LOAD = 287kg	Distributed uniformly along top edge
UNIFORM LOAD = 275kg	Distributed uniformly on whole panel
CONCENTRATED LOAD (TOP RAIL) = 80kg	Distributed uniformly along top rail, with glass pane removed
LINE LOAD (TOP RAIL) = 190kg	Centre of top rail, with glass pane removed

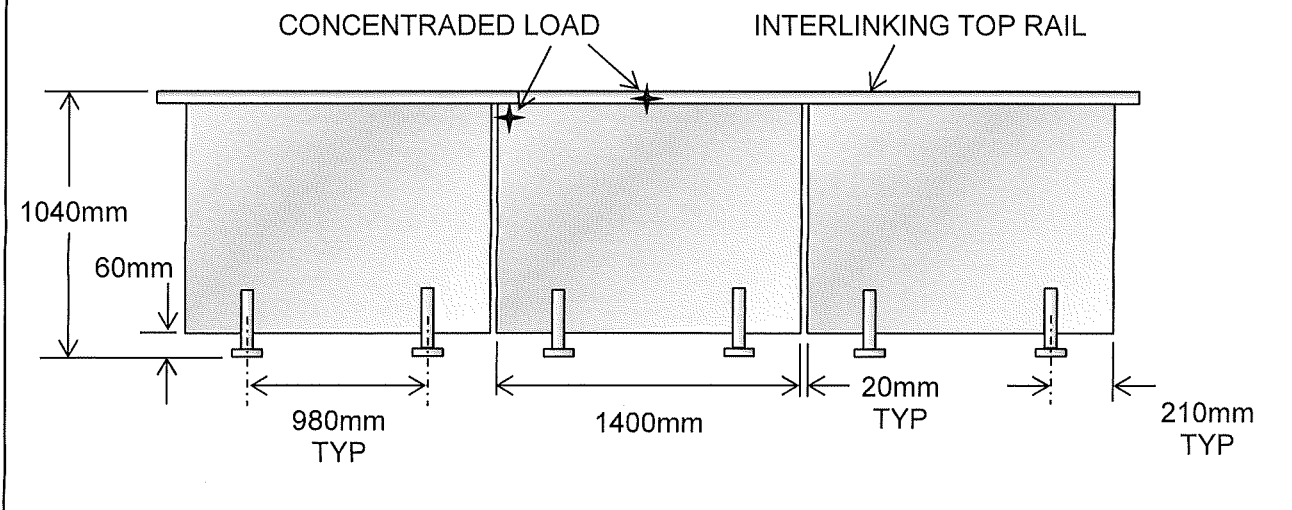


Figure 1 - Load requirements and balustrade dimensions

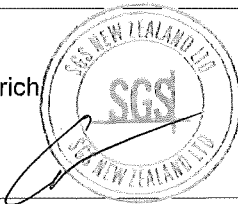
Acceptance Criteria: Report findings

Tested by: L. Siasoco & W. Laarich

Date: 25-Jul-17

Checked by: G. Schoutens

Date: 31-Aug-17



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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 14 days only.

5. FIXINGS (square mini post)

Lever Arm = 70 mm for 4 bolts

Max BM per spigot = $0.75 \times 1.6 \times 1.08 \times 1.5 / 2 = 0.97$ kNm

Loads per Bolt = $0.97 / 0.07 \times 2 = 6.9$ kN

Anchor Type	Capacity (ϕ Nt)	Comments
1. To Concrete		
M10 Dynabolts	14.2 kN	Embedment = 70 mm, $f_c = 25$ MPa, 90 mm edge dist. Epccon G6, $f_c = 25$ MPa, embedment = 90 mm
M10 Chemset	21.4 kN	
2. To Steel		
M10 Grade 4.6	25 kN	OK
3. To Timber		
M10 Bolts	25 kN	OK
Capacity of 50 x 50 washers	22 kN (dry) 13 kN (wet)	
M10 Coach screws (wet timber)	52.4 N/mm	
M10 Coach screws (dry timber)	74.9 N/mm	Req Length = 130 mm Req Length = 100 mm

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11. SUMMARY

In summary, the panel & fixings tested conform to the following:

LOADS:

Live Load: For Domestic Occupancy types A and C3 (residential only) of AS/NZS 1170:2002, Table 3.3

Wind Load: VERY HIGH as per NZS 3604 or 50 m/s Ultimate Limit State Wind Speed
HIGH wind zone for Pool Fence

GLASS:

Thickness: 12 mm Toughened Grade A

Maximum height is 1.08 m above finished floor level, 1.28 m for pool fence

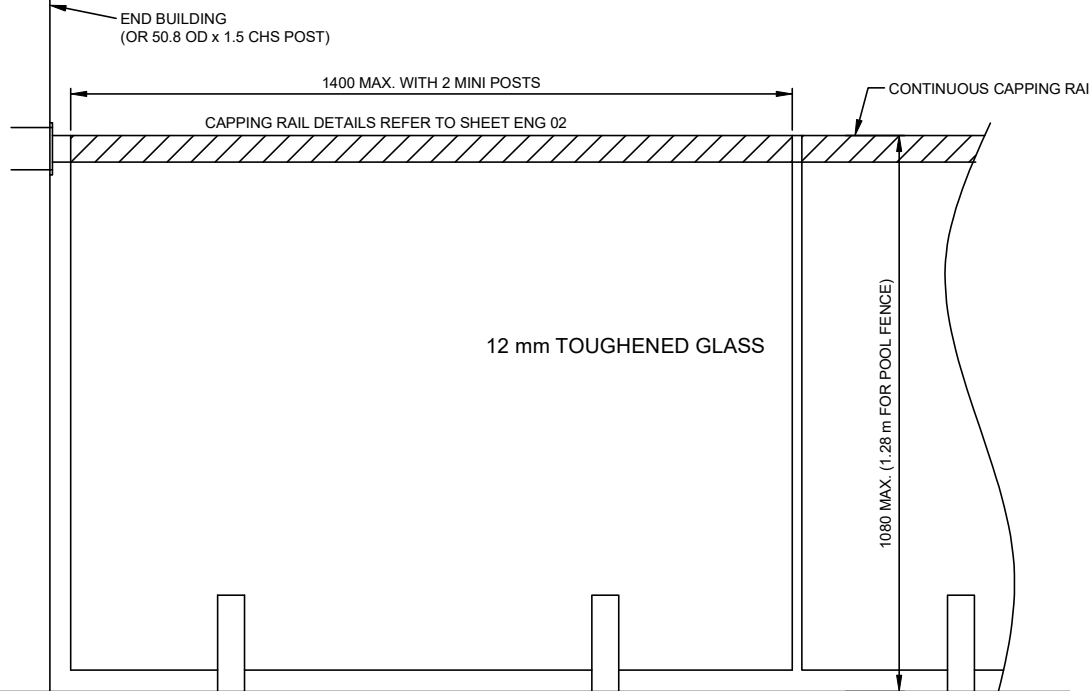
Capping Rail: 50.8 OD x 1.5 CHS or 25x21 RHS

FIXINGS:

Refer to attached summary drawing ENG 01 to ENG 02.

Note that it is assumed that the strength and stiffness of the substrate is sufficient to adequately resist the balustrade loads.

FRAMELESS GLASS BALUSTRADES SUPPORTED BY SQUARE MINI POSTS



ELEVATION

THIS GLASS BALUSTRADE SYSTEM IS SUITABLE FOR THE FOLLOWING:

LIVE LOAD:

OCCUPANCY TYPE	REFER TABLE 3.3 OF AS/NZS 1170	DESIGN LOAD
A C3 (Residential Only)	DOMESTIC BARRIERS SERVING ONE OR MORE DWELLINGS INCLUDING BALCONY EDGES. (NOT SUBJECT TO CROWD LOADINGS)	0.6 kN CONC LOAD ANYWHERE, OR 0.75 kN/m LINE LOAD AT 0.9 m ABOVE FLOOR LEVEL

WIND LOAD:

"VERY HIGH" WIND ZONE FOR BALUSTRADE, "HIGH" WIND ZONES FOR POOL FENCE.

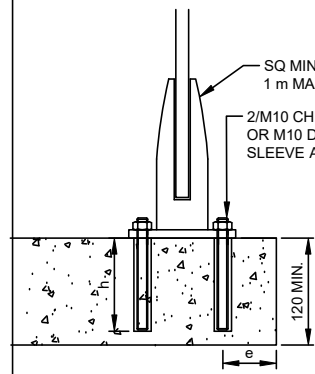
FIXINGS:

- A. ALL ANCHORS MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS.
- B. BOLTING ARRANGEMENT MUST COMPLY WITH RELEVANT MATERIAL CODES.
- C. STRENGTH & STIFFNESS OF THE SUBSTRATE STRUCTURE MUST BE SUFFICIENT FOR THE BALUSTRADE LOADS.

1. M10 CHEMSET ANCHORS (MAXIMA SPIN CAPSULES OR EPCON C6 SERIES) THE ANCHORS MUST COMPLY FULLY WITH THE MANUFACTURER'S REQUIREMENTS.
2. M10 G4.6 BOLTS TO STEEL MEMBERS. THE BOLTING ARRANGEMENT MUST COMPLY WITH NZS 3404:1997.
3. M10 G4.6 BOLTS TO TIMBER WITH 50 mm x 50 mm SQUARE WASHERS. THE BOLT ARRANGEMENT MUST COMPLY WITH NZS 3603:1993.
4. M10 COACH SCREWS TO WET TIMBER OR DRY TIMBER EMBEDMENT 'H' REFER TO TABLE.

DURABILITY

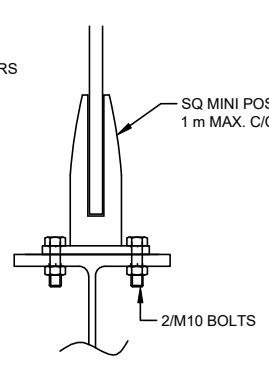
THE FIXINGS MUST COMPLY WITH SECTION 4 "DURABILITY" OF NZS 3604:2011



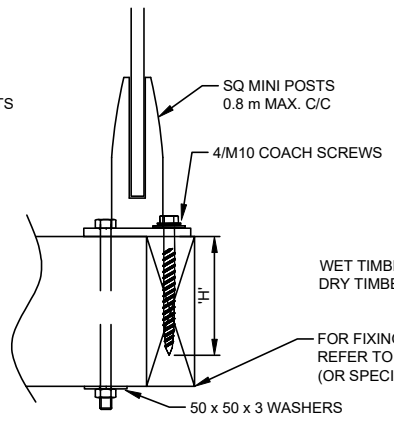
FOR CHEMSET: h = 90 mm, e = 40 mm
FOR DYNABOLT: h = 70 mm, e = 90 mm

CONNECTION TO CONCRETE

TOP MOUNTED CASE



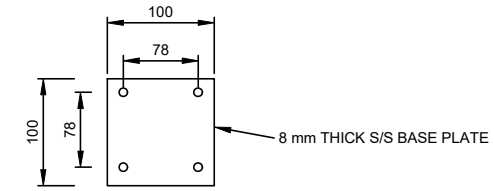
CONNECTION TO STEEL



CONNECTION TO TIMBER

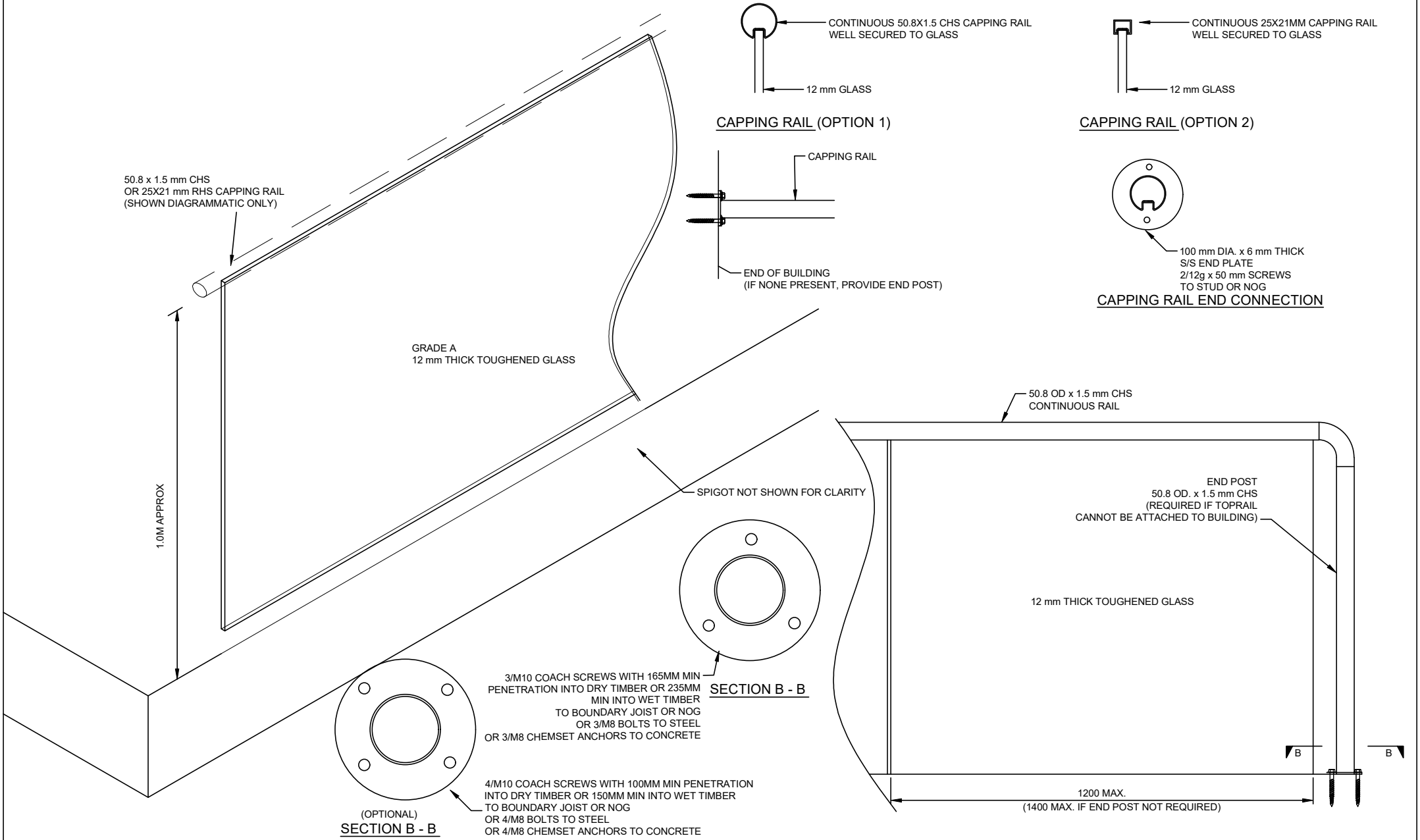
WET TIMBER 'H' 150mm
DRY TIMBER 100mm

FOR FIXING OF BOUNDARY JOISTS REFER TO NZS3604 FIG 7.10b (OR SPECIFICALLY DESIGNED BY OTHERS)



BASE PLATE DETAIL

GLASS BALUSTRADES CAPPING RAIL (TOP FIXED)



P & P CONSULTING ENGINEERS LTD Civil and Structural Engineering 6A Montel Avenue, Henderson ph: 836-1853	BALCO LTD FRAMELESS GLASS BALUSTRADES	Scales 1:10 (A3)	Project 17/357
	GLASS BALUSTRADE SUPPORTED BY MINI POSTS	Drawn HY	Date 31-10-17