

Our Ref : BCA BC 15.0.3

Building Plan and Management Division (#07-00)
Fax : 63254437
DID : 63258661
E-mail : goh_siam_imm@bca.gov.sg

16 Jul 2009

See **Distribution**

Dear Sir/Madam

SAFETY BARRIER AT WATERFRONTS

Objective

1 This circular is to inform the building industry of the safety barrier requirements at promenades or boardwalks along the waterfront.

Background

2 Section H of the Approved Document specifies that where there is a vertical drop in level of 1.0 metre or more in or around a building, provision of a safety barrier is required. The requirements in Section H are currently applicable to safety barriers in and around a building, even when the building is at the waterfront.

3 BCA has recently reviewed the requirements on safety barriers along the waterfront to address the changing expectations of the industry and to clarify the application of safety barrier requirements, especially those at promenades and boardwalks along the waterfront.

Revised requirements on barriers for promenades and boardwalks at the ground level along waterfront

4 The requirements in Section H will continue to apply to safety barriers in and around a building which is at the waterfront. However, **for promenades and boardwalks at ground level along the waterfront**, requirements on maximum opening or gap within the safety barrier and non-climbable features are not prescribed so as to provide greater flexibility in design. This revised requirement is specified in paragraph 3.4.6 of Section H, a copy of which is attached as Annex A.

5 Although there is no prescribed requirement on the maximum size of openings for safety barrier at promenades and boardwalks at ground level along the waterfront, Qualified Persons (QPs) are advised to exercise their professional judgment on the appropriate size of opening in their design so as to ensure safety

for the users. Furthermore, where the height of fall to the surface of the water level is less than 1 metre, QPs are advised to provide appropriate safety features or demarcation to identify the edge and warn users.

Examples of alternative solutions

6 Safety barriers may not be provided at promenades and boardwalks at the ground level along waterfront where –

- (a) there is a gentle slope towards the water and the gradient of slope is equal to or gentler than 1:3 (i.e. not steeper than an angle of 18.4° to the horizontal); or
- (b) there is a stepped approach towards the water.

7 Other examples of alternative solutions which can be considered are shown in Annex B.

Miscellaneous changes in Section H

8 We have also made some editorial changes in paragraphs 3.4.4, 3.4.5 and 3.4.7 in Section H, but these do not alter the current requirements in Section H.

Effective date

9 These revisions will take effect from 1 Aug 2009. The new edition of Section H is now available at BCA website at:
<http://www.bca.gov.sg/Publications/BuildingControlAct/others/Approveddoc.pdf>

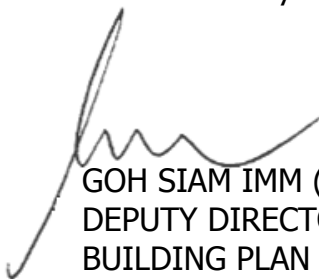
For information

10 If you need further clarification regarding this circular, you can contact the following officers –

Mr Tan Cheong Ee	(Tel: 63258638)
Mr Anson Seah	(Tel: 63258643)

11 I would appreciate it if you could convey the contents of this circular to members of your organization. Thank you.

Yours faithfully



GOH SIAM IMM (MS)
DEPUTY DIRECTOR, BUILDING PLAN DEPARTMENT
BUILDING PLAN AND MANAGEMENT DIVISION
for COMMISSIONER OF BUILDING CONTROL
BUILDING AND CONSTRUCTION AUTHORITY

DISTRIBUTION (via e-mail):

President
Singapore Institute of Architects (SIA)
79 Neil Road
Singapore 088904
info@sia.org.sg

President
Institution of Engineers, Singapore (IES)
70, Bukit Tinggi Road
Singapore 289758
iesnet@singnet.com.sg

President
Association of Consulting Engineers, Singapore (ACES)
70, Palmer Road, #04-06
Palmer House
Singapore 079427
acesing@starhub.net.sg

President
Real Estate Developers' Association of Singapore (REDAS)
190 Clemenceau Avenue
#07-01 Singapore Shopping Centre
Singapore 239924
enquiry@redas.com

President
Singapore Contractors Association Limited (SCAL)
Construction House
1 Bukit Merah Lane 2
Singapore 159760
enquiry@scal.com.sg

President
Society of Project Managers (SPM)
Macpherson Road P.O.Box 1083
Singapore 913412
sprojm@yahoo.com

President
Singapore Institute of Building Limited (SIBL)
70 Palmer Road,
#03-09C Palmer House
Singapore 079427
josephine@sib.com.sg

President
Singapore Institute of Surveyors & Valuers (SISV)
20 Maxwell Road #10-09B
Maxwell House Singapore 069113
sisv.info@sisv.org.sg

President
Singapore Structural Steel Society (SSSS)
232a River Valley Road
Singapore 238290
avconsul@pacific.net.sg

President
Geotechnical Society of Singapore
c/o Professional Activities Centre
NUS Faculty of Engineering
9 Engineering Drive 1
Singapore 117576
geoss@nus.edu.sg

President
The Tunnelling and Underground Construction Society Singapore (TUCSS)
c/o CMA International Consultants Pte Ltd
1 Liang Seah Street
#02-12 Liang Seah Place
Singapore 189022
info@tucss.org.sg

President
Professional Engineers Board, Singapore (PEB)
1st Storey, Tower Block, MND Complex,
5 Maxwell Road
Singapore 069110
registrar@peb.gov.sg

President
Board of Architects (BOA)
5 Maxwell Road
1st Storey Tower Block, MND Complex,
Singapore 069110
boarch@singnet.com.sg

Director
Protective Infrastructure & Estate
Defence Science & Technology Agency
1 Depot Road #03-01j
Singapore 109679
lcheehio@dsta.gov.sg

Deputy Chief Executive
Infrastructure & Development
Land Transport Authority
1 Hampshire Road
Block 8 Level 1
Singapore 219428
bok_ngam_lim@lta.gov.sg

Deputy Chief Executive Officer
Building Group
Housing & Development Board
HDB Hub, 480 Lorong 6 Toa Payoh
Singapore 310480
Ljm1@hdb.gov.sg

Deputy Director
Project Development & Maintenance Branch
Ministry Of Education
1 North Buona Vista Drive
Office Tower Level 9
Singapore 138675
eng_wee_tong@moe.gov.sg

Director
Best Sourcing Department
Public Utilities Board
40 Scotts Road #18-01
Environment Building
Singapore 228231
moh_wung_hee@pub.gov.sg

Director
Engineering Planning Group
JTC Corporation
The JTC Summit
8 Jurong Town Hall Road
Singapore 609434
giokhua@jtc.gov.sg

Director
Building
People's Association
9 Stadium Link
Singapore 397750
foo_soon_leng@pa.gov.sg

All CORENET e-Info subscribers

H SAFETY FROM FALLING

H.1	OBJECTIVE
H.1.1	The objective of paragraph H.2.1 is to protect people from injury caused by falling.
H.2	PERFORMANCE REQUIREMENT
H.2.1	Where there is a vertical drop in level of 1.0 m or more, appropriate measures shall be taken to prevent people from falling from a height.
H.2.2	The requirement in paragraph H.2.1 shall not apply to – (a) roofs or other areas generally not intended for human occupation; and (b) special service or usage areas such as loading or unloading bays, stages for performance or entertainment.
H.3	ACCEPTABLE SOLUTION
H.3.1	The requirement in paragraph H.2.1 is deemed to be satisfied if a barrier is provided in accordance with the specifications set out in paragraphs H.3.2 to H.3.4.
H.3.2	Height of barrier
H.3.2.1	The height of a barrier shall not be less than - (a) 1.0 m at all locations except for locations indicated in (b); (b) 900 mm at the lower edge of the window, stairs, ramps and gallery or balcony with fixed seating in areas such as theatres, cinemas and assembling halls. <i>Note:</i> 1. <i>The height of a barrier is measured vertically from the finished floor level to the top of the barrier.</i> 2. <i>The height of a barrier at the flight of stairs is measured vertically from the pitch line to the top of the barrier.</i> 3. <i>The requirements in paragraph H.3.2.1 do not apply to houses built by the owners for their own use.</i>

H.3.3	Horizontal loading and design of glass panel barriers
H.3.3.1	A barrier shall be designed to withstand a horizontal loading as prescribed in BS 6399: Part 1 – Loading for Buildings. Code of Practice for Dead and Imposed Loads.
H.3.3.2	Glass panel barriers shall be designed and installed in accordance with Section 8 of BS 6180 – Barriers in and about Buildings – Code of Practice.
H.3.4	Size of opening
H.3.4.1	The lowest 75mm of the barrier at the external wall shall be built solid.
H.3.4.2	The lowest 75 mm of the bay window shall not be openable.
H.3.4.3	In all buildings, except for industrial buildings (a) the size of any opening or gap in a barrier shall not be large enough as to permit the passage of a sphere of a diameter of 100 mm; and (b) the barrier at a location where there is a vertical drop in level of 3.0 m or more shall have no toeholds between the height of 150 mm and 750 mm above the finished floor level. The use of perforated sheet or mesh rigidly fixed over the full barrier height is acceptable provided the openings have a maximum dimension (other than the perimeter) of 50 mm.
H.3.4.4	In industrial buildings, the size of any opening or gap in a barrier shall not be large enough as to permit the passage of a sphere of a diameter of 150 mm.
H.3.4.5	For a flight of staircase, any triangular opening or void formed around a tread, riser and the bottom edge of the barrier, the size of any opening or gap shall not be large enough as to permit the passage of a sphere of a diameter of 150 mm.
H.3.4.6	The requirements under paragraph H.3.4 do not apply to promenades and boardwalks at ground level along the waterfront; or houses built by the owners for their own use.
H.3.4.7	The requirements in paragraph H.3.4.3 (b) do not apply to bay windows in a residential unit.

EXAMPLES OF ALTERNATIVE SOLUTIONS

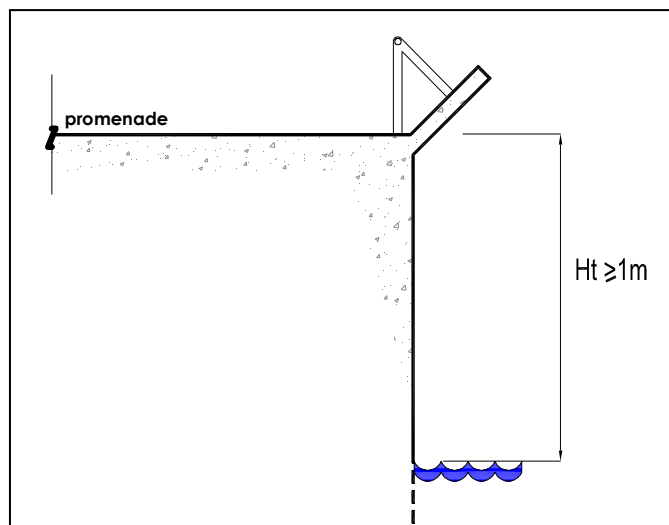
In the submission of alternative solutions for approval, the Qualified Person (QP) has to evaluate and take into account the local conditions as well as site circumstances that could affect the level of safety in his/her proposal. He/she must explain how the alternative solutions meet the objective and performance requirements of the building regulations to protect against accidental fall.

The following are examples of barriers with provision of appropriate measures to prevent people from falling accidentally from a height. They are intended to illustrate the principles and concepts used in the alternative solutions. These examples should not be treated as complete and should be used in conjunction with other relevant authorities' public safety guidelines, if any.

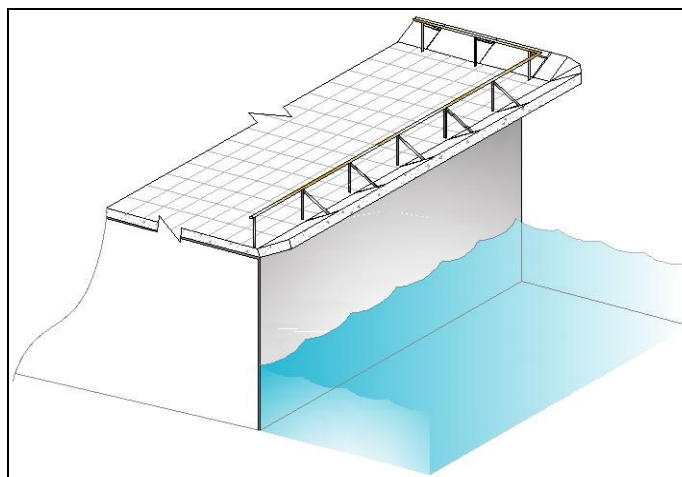
Example 1 - Barrier with continuous inclined low wall

The salient points are:

- a) The continuous railing at an appropriate height from the deck provides support for the users;
- b) The inclined wall while allowing an unobstructed view helps to prevent accidental fall.



Section

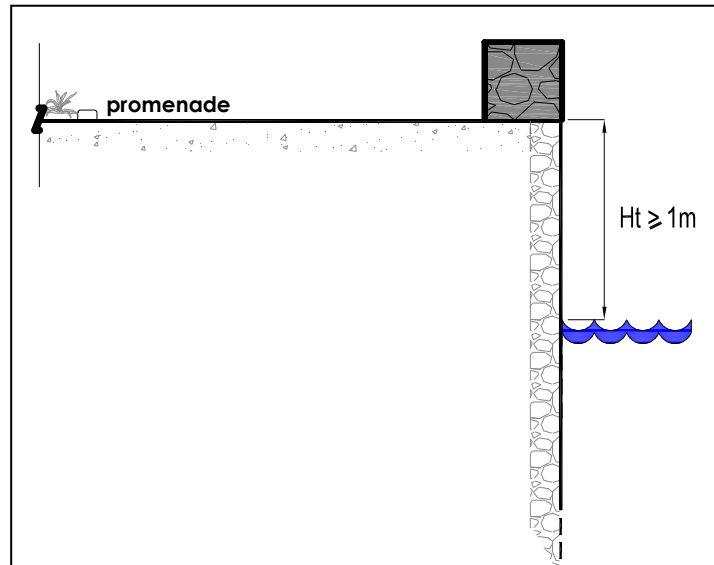


Isometric View

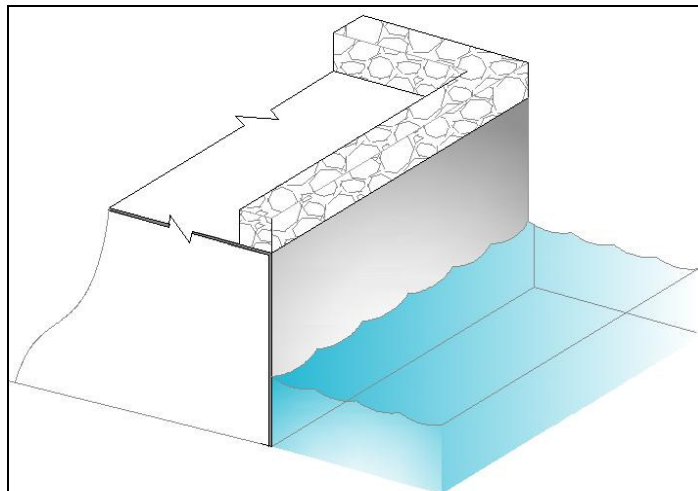
Example 2 - Continuous solid low wall

The salient points are:

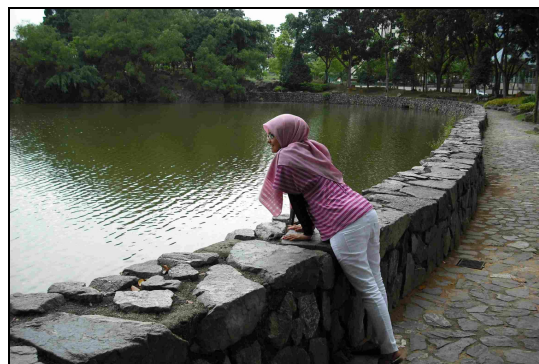
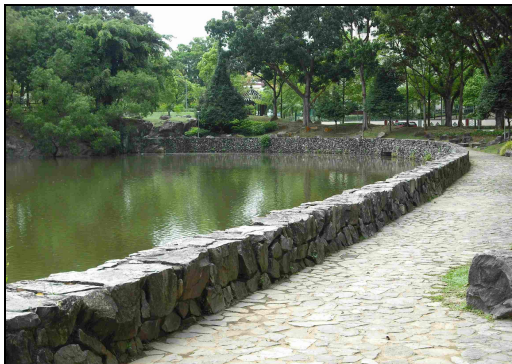
- a) The solid granite low wall with sufficient depth prevents people from toppling over the edge.



Section



Isometric View



Little Guilin Park