Series 400: Safety Barriers and Pedestrian Guardrails

Definition

1 The term "safety barrier system" shall mean the entire installation including all posts, supports, foundations, terminals, transitions and connections to different safety barrier systems or structures. It shall also include all necessary works affected by the installation including surfacing, amendments to drainage, cables and the like.

2 The term "safety barrier" shall mean that part of the safety barrier system which forms the Length of Need.

3 The term "Length of Need" shall mean that part of the safety barrier system which comprises the Minimum Approach Length, the Minimum Departure Length and the length of the hazard when measured along the length of the road.

4 The term "intermediate length" shall mean that part of the safety barrier system between the terminal and the Length of Need.

Safety Barrier System

Units

5 The units of measurement shall be:

(i) safety barriers.....linear metre.

(ii) terminals, transitions, connections to bridge parapets, connections to structures.....number.

Measurement

6 The measurement of safety barrier shall be the developed length of the Length of Need along the centre line of the beams or in the case of double sided safety barriers measured once only along the centre line of the safety barrier system.

7 The measurement of terminals, transitions and connections to bridge parapets and other structures shall be the complete installation and in the case of terminals shall include the "intermediate length" of barrier required beyond the Length of Need.

Itemisation

8 Separate items shall be provided for safety barrier system in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature	
I	1	Each type of safety barrier
	2	Each type of terminal
	3	Each type of transition
	4	Each type of connection to bridge parapet
	5	Each type of connection to structures
II	1	Straight or curved exceeding 120 metres radius
	2	Curved exceeding 50 metres radius but not exceeding 120 metres radius
	3	Curved not exceeding 50 metres radius
III	1	Double sided

Safety Barriers, Terminals, Transitions, Connections to Bridge Parapets and Connections to Structures

9 The items for safety barriers, terminals, transitions, connections to bridge parapets and connections to structures shall in accordance with the Preambles to Bill of Quantities General Direction include for:

Item Coverage

(a) fabrication (as Series 1800 paragraph 6);

(b) protective system (as Series 1900 paragraph 4);

(c) driving in any material for post foundations;

(d) fixing to structures including attachment systems and adaptor platforms;

(e) assembly of components;

(f) drilling or forming holes and pockets and casting in bolts, sockets, socket covers and filling, base plates and anchorage assemblies;

(g) attachments, adjuster assemblies, expansion assemblies, fixings, closure pieces, rigging screws, threaded terminals, attachments, fittings, fixings and stiffeners;

(h) threading ropes into and around posts;

(i) expansion joint anchorages;

(j) intermediate lengths;

(k) beams, rails, posts, supports, post caps, excluders, hooks and fittings;

(l) bedding;

(m) filling;

(n) safety check ropes, fork terminals, pins, thimbles, ferrules;

(o) anchor frames, surface mounted anchors and sockets;

(p) adjustment of safety barriers to flowing alignment;

(q) tensioning and retensioning;

(r) flaring;

(s) painting;

(t) cold milling (as Series 700 paragraph 28);

(u) excavation in any material (as Series 600 paragraphs 17, 18, 19 and 23);

(v) deposition of fill (as Series 600 paragraphs 33);

(w) disposal of material (as Series 600 paragraph 39);

(x) imported fill (as Series 600 paragraph 45);

(y) compaction of fill (as Series 600 paragraph 52);

(z) ground improvement where necessary for post foundation requirements;

(aa) alternative foundations and supports;

(bb) geotextile (as Series 600 paragraph 60);

(cc) casings and plastic sheeting;

(dd) fixing to or setting in concrete;

(ee) in-situ concrete (as Series 1700 paragraph 4);

(ff) precast concrete (as Series 1700 paragraph 9);

(gg) formwork (as Series 1700 paragraph 14);

(hh) reinforcement (as Series 1700 paragraph 25);

(ii) other materials;

(jj) facilities for Engineer proof loading;

(kk) proof loading;

(ll) provision of initial type test report, quality assurance and control information;

(mm) provision of independent check certificates;

(nn) provision of user installation/maintenance manual;

(oo) amendments to the Works;

(pp) Forming overflow slots, weep holes and other openings in in-situ concrete barrier

(qq) Provision of material specification, drawing, installation requirements and other relevant information on the Safety Barrier System to be installed;

(rr) Ascertain the suitability of the site ground conditions.

Delivery of Materials and Equipment for Maintenance Purposes

Units

10 The units of measurement shall be:

(i) delivery of safety barrier for maintenance purposes.....linear metre.

(ii) delivery of terminals, transitions, connections to bridge parapets, connections to structures for maintenance purposes.....number.

(iii) delivery of specialised installation, maintenance and demolition equipment for maintenance purposes.....item

(iv) training for maintenance purposes.....item

Measurement

11 The measurement of delivery of safety barrier for maintenance purposes shall be all the components which are required to form the developed length along the centre line of the beams or in the case of double sided safety barriers measured once only along the centre line of the safety barrier system.

12 The measurement of delivery of terminals, transitions, connections to bridge parapets, connections to structures for maintenance purposes shall be all the components which are required to form the numbers stated in the Contract.

Itemisation

13 Separate items shall be provided for delivery of materials and equipment for maintenance purposes in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature	
I	1	Each type of safety barrier
	2	Each type of terminal
	3	Each type of transition
	4	Each type of connection to bridge parapet
	5	Each type of connection to structures
	6	Each type of equipment
	7	Each type of training
II	1	Double sided

Delivery of Materials and Equipment for Maintenance Purposes

14 The items for delivery of materials and equipment for maintenance purposes shall shall in accordance with the Preambles to Bill of Quantities General Direction include for:

Item Coverage

(a) loading, transporting from supplier, unloading and positioning at store;

(b) replacing items damaged during the foregoing operations;

(c) making good to protective systems.

Remove from Store and Re-erect Safety Barriers

Units

15 The units of measurement shall be:

(i) remove from store and re-erect safety barrier.....linear metre.

(ii) remove from store and re-erect terminals, transitions, anchorages, connections to bridge parapets, connections to structures.....number.

Measurement

16 The measurement of remove from store and re-erect safety barrier shall be the developed length along the centre line of the beams or in the case of double sided safety barriers measured once only along the centre line of the safety barrier system between the following points:

(a) the end of each safety barrier type at a connection to bridge parapet or other structure or within a connection between two different safety barrier types;

(b) the connection of safety barriers to terminals, transitions, anchorages and expansion joint anchorages.

17 The measurement of remove from store and re-erect terminals, transitions, anchorages, expansion joint anchorages and connections to bridge parapets and other structures shall be the complete installation.

Itemisation

18 Separate items shall be provided for remove from store and re-erect safety barriers in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature	
I	1	Each type of safety barrier
	2	Each type of terminal
	3	Each type of transition
	4	Each type of anchorage including expansion joint anchorages
	5	Each type of connection to bridge parapet
	6	Each type of connection to structures
II	1	Straight or curved exceeding 120 metres radius
	2	Curved exceeding 50 metres radius but not exceeding 120 metres radius
	3	Curved not exceeding 50 metres radius
III	1	Double sided

Remove from Store and Re-erect Safety Barriers

19 The items for remove from store and re-erect safety barriers shall in accordance with the Preambles to Bill of Quantities General Direction include for:

Item Coverage

(a) loading, transporting from store, unloading and positioning for re-erection;

(b) replacing items damaged during the foregoing operations;

(c) modification and new materials;

(d) safety barriers (as this Series paragraph 9);

(e) making good to protective systems.

Remove from Store and Re-erect Terminals, Transitions and Connections to Bridge Parapets

20 The items for remove from store and re-erect terminals, transitions, connections to bridge parapets and connection pieces shall in accordance with the Preambles to Bill of Quantities General Direction include for:

Item Coverage

(a) loading, transporting from store, unloading and positioning for re-erection;

(b) replacing items damaged during the foregoing operations;

(c) modification and new materials;

(d) terminals, transitions, anchorages, connections to bridge parapets and connections to structures (as this Series paragraph 9);

(e) making good to protective systems.

Temporary Vertical Concrete Safety Barriers

Units

21 The units of measurement shall be:

(i) temporary vertical concrete safety barriers.....linear metre.

(ii) temporary vertical concrete safety barrier transitions, temporary vertical concrete safety barrier terminations.....number

Measurement

22 The measurement of temporary vertical concrete safety barriers shall be the developed length along the centre line of the barriers between terminations.

Itemisation

23 Separate items shall be provided for temporary vertical concrete safety barriers in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature	
I	1	Each type of barrier
	2	Each type of transition
	3	Each type of termination
II	1	Straight or curved exceeding 50 metres radius
	2	Curved not exceeding 50 metres radius
III	1	Units supplied by Road Authority
	2	Units supplied by Contractor
IV	1	Units to be handed over to Road Authority on completion
	2	Ownership of units to be retained by Contractor on completion

Temporary Vertical Concrete Safety Barriers

24 The items for temporary vertical concrete safety barriers shall in accordance with the Preambles to Bill of Quantities General Direction include for:

Item Coverage

(a) loading, transporting from store, unloading and positioning for re-erection;

(b) replacing items damaged during the foregoing operations;

(c) excavation in any material (as Series 600 paragraphs 17, 18, 19 and 23);

(d) disposal of material (as Series 600 paragraph 39);

(e) concrete (as Series 1700 paragraph 4);

(f) formwork (as Series 1700 paragraph 14);

(g) reinforcement (as Series 1700 paragraph 25);

(h) joints and gaskets including movement joints;

(i) foundations and bases;

(j) filling;

(k) attachment systems and fixings;

(l) adjustment to flowing alignment;

(m) fabrication (as Series 1800 paragraph 6);

(n) protective system (as Series 1900 paragraph 4);

(o) cast-in sockets, bolts, nuts, washers;

(p) make-up units;

(q) dowel bars;

(r) treatment at lighting columns and the like including cover plates, sub-frames, plates and fixings;

(s) On completion, loading, transportation from site, unloading.

Temporary Vertical Concrete Safety Barrier Terminations and Transitions

25 The items for temporary vertical concrete safety barrier terminations and transitions shall in accordance with the Preambles to Bill of Quantities General Direction include for:

(a) temporary vertical concrete safety barriers (as this Series paragraphs 19);

(b) fixing to or setting in concrete;

(c) fixing to temporary vertical safety barriers including attachment systems and connectors.

Pedestrian Guardrails and Handrails

Units

26 The unit of measurement shall be:

(i) pedestrian guardrails, handrails.....linear metre.

Measurement

27 The measurement of pedestrian guardrails and handrails shall be the developed length along the centre line. The height of pedestrian guardrails shall be the height between the top of the top rail and the finished level of the surface directly beneath the guardrail.

Itemisation

28 Separate items shall be provided for pedestrian guardrails and handrails in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature	
I	1	Each type of pedestrian guardrail
	2	Each type of handrail
II	1	Different heights
III	1	Elements curved in plan to different radii

Pedestrian Guardrails and Handrails

29 The items for pedestrian guardrails and handrails shall in accordance with the Preambles to Bill of Quantities General Direction include for:

Item Coverage

(a) excavation in any material (as Series 600 paragraphs 17, 18, 19 and 23);

(b) disposal of material (as Series 600 paragraph 39);

(c) in-situ concrete (as Series 1700 paragraphs 4);

(d) formwork (as Series 1700 paragraph 14);

(e) reinforcement (as Series 1700 paragraph 25);

(f) backfilling and compaction;

(g) metal parapets (as Series 2200 paragraph 5);

(h) gates (as Series 300 paragraph 6).

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Series 400: Safety Barriers and Pedestrian Guardrails

Item	*Root Narrative*	*Unit*
	Safety Barrier Systems	
1	3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7* 8*	m
2	Transition from 3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7* to 3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7*	no
3	Terminal for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7*	no
4	In-situ concrete barrier 8*	m
5	In-situ concrete barrier terminal	no
6	In-situ concrete barrier transition to 3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7*	no
7	In-situ concrete barrier transition to double in-situ concrete barrier	no
	Delivery of Materials and equipment	
8	3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	m
9	Terminal unit for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
10	Transition from 3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7* to 3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7*	no
11	Anchorage unit for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
12	Expansion joint anchorage unit for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
13	Connection piece to bridge parapet for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
14	Connection piece to structure for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
15	Installation maintenance and demolition manual	no
16	Installation maintenance and demolition equipment	no
17	Training	item
	Remove from Store and Re-erect Safety Barrier	
18	1* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back Level 7* 8*	m
19	1* Terminal unit for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no

Item	*Root Narrative*	*Unit*
20	1* Transition from 3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7* to 3* Containment Level 4* Impact Severity Level 5* Working Width 6* Set-back 7*	no
21	1* Anchorage unit for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
22	1* Expansion joint anchorage unit for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
23	1* Connection piece to bridge parapet for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
24	1* Connection piece to structure for 3* Containment Level 4* Impact Severity Level 5* Working Width 6* safety barrier	no
25	1* untensioned 3* 2* 8*	m
26	1* untensioned 3* 2* 8*	m
27	1* 13* driven post 14* for 3* 2*	no
28	1* 13* post 14* for setting in concrete or socket for 3* 2*	no
29	1* 8* surface mounted post 14* fixed to structure or foundation for 3* 2*	no
30	1* mounting bracket 15* fixed to structure for 3* 2*	no
31	1* terminal section for untensioned 3* 2*	no
32	1* terminal section for tensioned 3* 2*	no
33	1* full height anchorage for 3* 2*	no
34	1* expansion joint anchorage for 3* 2*	no
35	1* 10* connection of 3* 2* to bridge parapet	no
36	1* 10* connection piece for 3* open box beam to 3* corrugated beam	no
37	16* concrete foundation for post 1* for 2*	no
38	Concrete foundation 10* spanning filter drain for post 1* for 2*	no
39	16* socketed foundation for post 1* for 2*	no
	Temporary Vertical Concrete Safety Barriers	
40	Temporary Vertical Concrete Safety Barrier 9*	m
41	Temporary Vertical Concrete Safety Barrier Transition to 10*	no
42	Temporary Vertical Concrete Safety barrier Termination	no
	Pedestrian Guardrails and Handrails	
43	10* pedestrian guardrails 11* high 12*	
44	10* handrails 11* high 12*	m

Group	*Variables*	
1*	(i)	= remove from store and re-erect
	(ii)	= removed from store and re-erected
2*	(i)	= corrugated beam
	(ii)	= open box beam
	(iii)	= open box beam with standard stiffeners
	(iv)	= open box beam with non-standard stiffeners [stated type]
	(v)	= rectangular hollow section beam size 100 mm x 100 mm
	(vi)	= rectangular hollow section beam size 100 mm x 200 mm
	(vii)	= double rail open box beam
3*	(i)	= single sided
	(ii)	= double sided
	(iii)	= top fixed
	(iv)	= side fixed
4*	(i)	= N1
	(ii)	= N2
	(iii)	= H1
	(iv)	= H2
	(v)	= H3
	(vi)	= H4a
	(vii)	= H4b
5*	(i)	= A
	(ii)	= B
6*	(i)	= W1
	(ii)	= W2
	(iii)	= W3
	(iv)	= W4
	(v)	= W5
	(vi)	= W6
	(vii)	= W7
	(viii)	= W8
7*	(i)	= [stated distance] metres
8*	(i)	= straight or curved exceeding 120 metres radius
	(ii)	= curved exceeding 50 metres radius but not exceeding 120 metres radius
	(iii)	= curved not exceeding 50 metres radius
9*	(i)	= straight or curved exceeding 50 metres radius
	(ii)	= curved not exceeding 50 metres radius

Group	Variables	
10*	(i)	= [stated type]
11*	(i)	= [unique height]
12*	(i)	= No entry
	(ii)	= formed to radius of [unique radius] metres
13*	(i)	= No entry
	(ii)	= short
	(iii)	= long
	(iv)	= non-standard [stated type]
14*	(i)	= No entry
	(ii)	= with offset brackets [stated type]
	(iii)	= with standard spacers
	(iv)	= with non-standard spacers [stated type]
15*	(i)	= No entry
	(ii)	= on adaptor platform [stated type]
16*	(i)	= No entry
	(ii)	= standard
	(iii)	= non-standard

Series 400: Safety Barriers and Pedestrian Guardrails

1 Safety Barriers

The MMRW provides for three categories of curvature for payment purposes. Curves which are made up from individual straight lengths of beams should not be considered to be small lengths of straight fence. They should be measured as curved fences within the Group II features in MMRW. The radius is to be considered to be the radius equal to that of the arc which passes through the posts.

2 Pedestrian Guardrails and Handrails

Curves which are made up from individual straight lengths should not be considered as curved elements but as straight guardrails or handrails.

Where the rails are actually curved they should be measured as curved guardrails or handrails as described by the specific radius.