

**Series 400: Safety Fences, Safety Barriers and Pedestrian Guardrails**

**Definition**

**1** The term “beam” shall mean a longitudinal member spanning posts and mounting brackets within the limits defined in paragraph 4 below. The term “mounting bracket” shall be deemed to include the term “bridge pier or concrete parapet mounting connection”.

**2** The term “wire rope” shall mean the complete rope system for the wire rope safety fence comprising upper and lower ropes together with inherent component ropes of all types and tail ropes but excluding safety check ropes.

**Beam Safety Fences**

**Units**

**3** The units of measurement shall be:

- (i) beams ..... linear metre.
- (ii) posts, mounting brackets, terminal sections, full height anchorages, expansion joint anchorages, connections to bridge parapets, connection pieces, concrete foundations and socketed foundations to posts ..... number.

**Measurement**

**4** The measurement of beams shall be the developed length along the center line of the beams or in the case of double sided fences and double rail fences, measured once only along the centre line of the posts, between the following points:

- (a) the end of each beam type at a connection to bridge parapet or within a connection piece assembly;
- (b) the connection of beams to terminal sections, full height anchorages and expansion joint anchorages.

**5** The measurement of terminal sections, full height anchorages, expansion joint anchorages and connections to bridge parapets shall be the complete installation. Mounting brackets and all other posts required between those points defined in paragraph 4 shall be measured. Concrete foundations and socketed foundation to posts, between those points defined in paragraph 4, shall only be measured for those locations stated in the Contract.

**6** The measurement of connection pieces shall be the complete installation.

**7** The measurement of expansion joint anchorages shall be for each anchorage on each side of the expansion joint.

**Itemisation**

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

Group	Feature
I	1 Each type of beam.
	2 Each type of post.
	3 Each type of mounting bracket.
	4 Each type of terminal section.
	5 Each type of full height anchorage.
	6 Each type of expansion joint anchorage.
	7 Each type of connection to bridge parapet.
	8 Each type of connection piece.
	9 Each type of concrete foundation to post.
	10 Each type of socketed foundation to post.
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 rail.
IV	1	Double sided.

**Beams**

**9** The items for beams shall in accordance with the Preambles to Bill of Quantities General Directions include for:

Item coverage

- (a) fabrication (as Series 1800 paragraph 6);
- (b) protective system (as Series 1900 paragraph 4);
- (c) attachments, adjuster assemblies, expansion assemblies, fixings, closure pieces and stiffeners;
- (d) adjustment of beams to flowing alignment;
- (e) tensioning or retensioning;
- (f) flaring;
- (g) painting.

**Posts**

**10** The items for posts shall in accordance with the Preambles to Bill of Quantities General Directions include for:

Item coverage

- (a) fabrication (as Series 1800 paragraph 6);
- (b) protective system (as Series 1900 paragraph 4);
- (c) driving in any material;
- (d) fixing to structures including attachment systems;
- (e) fixing to beam including spacers;
- (f) drilling or forming holes and pockets and casting in bolts, base plates and anchorage assemblies;
- (g) bedding;
- (h) filling.

**Mounting Brackets**

**11** The items for mounting brackets shall in accordance with the Preambles to Bill of Quantities General Directions include for:

Item coverage

- (a) fabrication (as Series 1800 paragraph 6);
- (b) protective system (as Series 1900 paragraph 4);
- (c) fixing to structures including adaptor platforms;
- (d) fixing to beam;
- (e) drilling or forming holes and pockets and casting in bolts, base plates and anchorage assemblies.

**Terminal Sections, Full Height Anchorages, Expansion Joint Anchorages,**

**12** The items for terminal sections, full height anchorages, expansion joint anchorages, connections to bridge parapets and connection pieces shall in accordance with the Preambles to Bill of Quantities General Directions include

**Connections to Bridge  
Parapets and Connection  
Pieces**

for:

Item coverage

- (a) posts (as this Series paragraph 10);
- (b) beams (as this Series paragraph 9);
- (c) excavation in any material (as Series 600 paragraphs 17, 18, 19 and 23);
- (d) concrete (as Series 1700 paragraphs 5 and 10);
- (e) formwork (as Series 1700 paragraph 15);
- (f) reinforcement (as Series 1700 paragraph 26);
- (g) disposal of material (as Series 600 paragraph 39);
- (h) fixing to or setting in concrete;
- (i) terminal end shoes;
- (j) precast concrete fairings;
- (k) in the case of terminal sections to untensioned corrugated beam, acceptable material, ramp, backfilling and compaction;
- (l) casings and plastic sheeting;
- (m) sockets, socket covers and filling.

**Concrete Foundations to  
Posts**

**13** The items for concrete foundations to posts shall in accordance with the Preambles to Bill of Quantities General Directions 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) concrete (as Series 1700 paragraphs 5 and 10);
- (d) formwork (as Series 1700 paragraph 15);
- (e) reinforcement (as Series 1700 paragraph 26);
- (f) plastic sheeting;
- (g) casings.

**Socketed Foundations  
to Posts**

**14** The items for socketed foundations to posts shall in accordance with the Preambles to Bill of Quantities General Directions include for:

Item coverage

- (a) fabrication (as Series 1800 paragraph 6);
- (b) protective system (as Series 1900 paragraph 4);
- (c) concrete foundations to posts (as this Series paragraph 13);
- (d) socket covers and filling.

**Remove from Store and Re-erect Beam Safety Fences**

- Units **15** The units of measurement shall be:
- (i) remove from store and re-erect beams ..... linear metre.
  - (ii) remove from store and re-erect posts, mounting brackets, terminal sections, full height anchorages, expansion joint anchorages, connections to bridge parapets, connection pieces ..... number.
  - (iii) concrete foundations and socketed foundations to re-erected posts.... number.

Measurement **16** The measurement of re-erected beam safety fences shall be in accordance with paragraphs 4, 5, 6 and 7 of this Series.

Itemisation **17** Separate items shall be provided for remove from store and re-erect beam safety fences in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Each type of re-erected beam.
	2 Each type of re-erected post.
	3 Each type of re-erected mounting bracket.
	4 Each type of re-erected terminal section.
	5 Each type of re-erected full height anchorage.
	6 Each type of re-erected expansion joint anchorage.
	7 Each type of re-erected connection to bridge parapet.
	8 Each type of re-erected connection piece.
	9 Each type of concrete foundation to re-erected post.
	10 Each type of socketed foundation to re-erected post.
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.

**Remove from Store and Re-erect Beams** **18** The items for remove from store and re-erect beams shall in accordance with the Preambles to Bill of Quantities General Directions 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) beams (as this Series paragraph 9);
  - (e) making good to protective system.

**Remove from Store and Re-erect Posts** **19** The items for remove from store and re-erect posts shall in accordance with the Preambles to Bill of Quantities General Directions 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) posts (as this Series paragraph 10);
- (e) making good to protective system.

**Remove from Store and Re-erect Mounting Brackets** 20 The items for remove from store and re-erect mounting brackets shall in accordance with the Preambles to Bill of Quantities General Directions 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) mounting brackets (as this Series paragraph 11);
  - (e) making good to protective system.

**Remove from Store and Re-erect Terminal Sections Full Height Anchorages Expansion Joint Anchorages Connections to Bridge parapets and Connection Pieces** 21 The items for remove from store and re-erect terminal sections, full height anchorages, expansion joint anchorages, connections to bridge parapets and connection pieces shall in accordance with the Preambles to Bill of Quantities General Directions 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) terminal sections, full height anchorages, expansion joint anchorages, connections to bridge parapets and connection pieces (as this Series paragraph 12);
  - (e) making good to protective system.

**Concrete Foundations and Socketed Foundations to Re-erected Posts** 22 The items for concrete foundations and socketed foundations to re-erected posts shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item coverage
- (a) concrete foundations to posts (as this Series paragraph 13);
  - (b) socketed foundations to posts (as this Series paragraph 14).

**Post Extension Units**

Units 23 The unit of measurement shall be:

- (i) post extension units ..... number.

Itemisation 24 Separate items shall be provided for post extension units in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Each type of post extension unit.

**Post Extension Units** 25 The items for post extension units shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item coverage
- (a) fabrication (as Series 1800 paragraph 6);
  - (b) protective system (as Series 1900 paragraph 4);
  - (c) drilling existing posts;
  - (d) fixing to existing posts.

**Raising Existing Sockets**

Units 26 The unit of measurement shall be:

- (i) raising existing sockets ..... number.

Itemisation 27 Separate items shall be provided for raising existing sockets in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Raising each type of existing socket.

**Raising Existing Sockets** 28 The items for raising existing sockets shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item coverage
- (a) removing existing posts and setting aside for re-use;
  - (b) cleaning out sockets;
  - (c) in situ concrete (as Series 1700 paragraph 5);
  - (d) formwork (as Series 1700 paragraph 15);
  - (e) loading, transporting from store, unloading and positioning for re-erection;
  - (f) removing from store and re-erecting posts (as this Series paragraph 19);
  - (g) replacing items damaged during the foregoing operations;
  - (h) making good to protective systems.

**Wire Rope Safety Fence**

Units 29 The units of measurement shall be:

- (i) wire rope ..... linear metre.

- (ii) posts, intermediate anchorages, end anchorages, concrete foundations and socketed foundations to posts ..... number.

**Measurement**      **30**      The measurement of wire rope shall be the undeveloped length measured once only along the centre line of the fence on plan from midway between the anchor blocks at one end to midway between the anchor blocks at the other end.

**31**      The measurement of intermediate anchorages and end anchorages shall be the complete installation.

Concrete foundations and socketed foundations shall only be measured for those locations stated in the Contract.

**temisation**      **32**      Separate items shall be provided for wire rope safety fences in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1      Wire rope.
	2      Each type of post.
	3      Each type of intermediate anchorage.
	4      Each type of end anchorage.
	5      Each type of concrete foundation to post.
	6      Each type of socketed foundation to posts.

**Wire rope**      **33**      The items for wire rope shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item coverage**
- (a) fabrication (as Series 1800 paragraph 6);
  - (b) protective system (as Series 1900 paragraph 4);
  - (c) rigging screws, threaded terminals, attachments, fittings and fixings;
  - (d) adjustments and tensioning;
  - (e) threading ropes into and around posts.

**Posts**      **34**      The items for posts shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item coverage**
- (a) fabrication (as Series 1800 paragraph 6);
  - (b) protective system (as Series 1900 paragraph 4);
  - (c) driving in any material;
  - (d) fixing to structures including attachment systems;
  - (e) post caps, excluders, hooks and fittings;
  - (f) drilling or forming holes and pockets and casting in bolts, base plates, sockets and anchorage assemblies;
  - (g) bedding;
  - (h) filling.

**Intermediate Anchorages and End Anchorages** **35**      The items for intermediate anchorages and end anchorages shall in accordance with the Preambles to Bill of Quantities General Directions include for:

Item coverage		<ul style="list-style-type: none"> <li>(a) fabrication (as Series 1800 paragraph 6);</li> <li>(b) protective system (as Series 1900 paragraph 4);</li> <li>(c) excavation in any material (as Series 600 paragraphs 17, 18, 19 and 23);</li> <li>(d) concrete (as Series 1700 paragraphs 5 and 10);</li> <li>(e) formwork (as Series 1700 paragraph 15);</li> <li>(f) reinforcement (as Series 1700 paragraph 26);</li> <li>(g) disposal of material (as Series 600 paragraph 39);</li> <li>(h) safety check ropes, fork terminals, pins, thimbles, ferrules, attachments, fixings and fittings;</li> <li>(i) anchor frames, surface mounted anchors and sockets;</li> <li>(j) fixing to anchor block including attachment systems;</li> <li>(k) drilling or forming holes and pockets and casting in bolts, base plates, sockets and anchorage assemblies.</li> </ul>
<b>Concrete Foundations To Posts</b>	<b>36</b>	The items for concrete foundations to posts shall in accordance with the Preambles to Bill of Quantities General Directions include for:
Item coverage		<ul style="list-style-type: none"> <li>(a) excavation in any material (as Series 600 paragraphs 17, 18, 19 and 23);</li> <li>(b) disposal of material (as Series 600 paragraph 39);</li> <li>(c) concrete (as Series 1700 paragraphs 5 and 10);</li> <li>(d) formwork (as Series 1700 paragraph 15);</li> <li>(e) reinforcement (as Series 1700 paragraph 26);</li> <li>(f) plastic sheeting;</li> <li>(g) casings.</li> </ul>
<b>Socketed Foundations to Posts</b>	<b>37</b>	The items for socketed foundations to posts shall in accordance with the Preambles to Bill of Quantities General Directions include for:
Item coverage		<ul style="list-style-type: none"> <li>(a) fabrication (as Series 1800 paragraph 6);</li> <li>(b) protective system (as Series 1900 paragraph 4);</li> <li>(c) concrete foundations to posts (as this Series paragraph 36);</li> <li>(d) socket covers and filling.</li> </ul>
<b>Concrete Safety Barriers</b>		
Units	<b>38</b>	The units of measurement shall be: <ul style="list-style-type: none"> <li>(i) concrete safety barriers ..... linear metre.</li> <li>(ii) concrete safety barrier terminations, transitions ..... number.</li> </ul>
Measurement	<b>39</b>	The measurement of concrete safety barriers shall be the developed length along the centre line of the barriers between terminations.



Itemisation **40** Separate items shall be provided for 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 termination.
	3 Each type of transition.
II	1 Straight or curved exceeding 50 metres radius.
	2 Curved not exceeding 50 metres radius.

**Concrete Safety Barriers 41** The items for concrete safety barriers shall in accordance with the Preambles to Bill of Quantities General Directions 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) concrete (as Series 1700 paragraph 5 and 10);
  - (d) formwork (as Series 1700 paragraph 15);
  - (e) reinforcement (as Series 1700 paragraph 26);
  - (f) joints and gaskets including movement joints;
  - (g) foundations and bases;
  - (h) filling;
  - (i) attachment systems and fixings;
  - (j) adjustment to flowing alignment;
  - (k) fabrication (as Series 1800 paragraph 6);
  - (l) protective system (as Series 1900 paragraph 4);
  - (m) cast-in sockets, bolts, nuts, washers;
  - (n) make-up units;
  - (o) dowel bars;
  - (p) treatment at lighting columns and the like including cover plates, sub-frames, plates and fixings.

**Concrete Safety Barrier Terminations and Transitions 42** The items for concrete safety barrier terminations and transitions shall in accordance with the Preambles to Bill of Quantities General Directions included for:

- Item coverage
- (a) concrete safety barriers (as this Series paragraph 41);
  - (b) fixing to or setting in concrete;
  - (c) attachment systems and connectors for fixing to beam safety fences.

**Pedestrian Guardrails and Handrails**

- Units **43** The unit of measurement shall be:
- (i) pedestrian guardrails, handrails ..... linear metre.
- Measurement **44** 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 **45** 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** **46** The items for pedestrian guardrails and handrails shall in accordance with the Preambles to Bill of Quantities General Directions 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 paragraph 5);
  - (d) formwork (as Series 1700 paragraph 15);
  - (e) reinforcement (as Series 1700 paragraph 26);
  - (f) backfilling and compaction;
  - (g) metal parapets (as Series 2200 paragraph 5);
  - (h) gates (as Series 300 paragraph 6);
  - (j) rivets, nuts, bolts, shims, washers, welds, clamps and the like.

**Loading Tests on Post Foundations**

- Units **47** The unit of measurement for loading test on post foundation shall be:
- (i) loading test on post foundation carried out by Contractor, loading test on post foundation carried out by Overseeing Organisation ..... number.

Itemisation **48** Separate items shall be provided for loading test on post foundation in accordance with Chapter II paragraphs 3 and 4 and the following:

Group	Feature
I	1 Loading test on post foundation carried out by Contractor.
	2 Loading test on post foundation carried out by Overseeing Organisation.
II	1 Different types of safety fence posts.
III	1 Different sizes of safety fence posts.

**Loading Test on Post Foundation Carried Out by Contractor** **49** The items for loading test on post foundation carried out by Contractor shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item coverage
- (a) posts (as this Series paragraph 10);
  - (b) concrete foundations to posts (as this Series paragraph 13);
  - (c) socketed foundations to posts (as this Series paragraph 14);
  - (d) provision, maintenance and subsequent removal of test equipment;
  - (e) provision, maintenance and subsequent removal of reaction vehicle;
  - (f) preparation and submission of results to the Overseeing Organisation;
  - (g) removal of test posts and foundations;
  - (h) disposal of material (as Series 600 paragraph 39);
  - (i) reinstatement and making good;
  - (j) traffic safety and management (as Series 100 paragraph 26).

**Loading Test on Post  
Foundation Carried  
Out by Overseeing  
Organisation**

**50** The items for loading test on post foundation carried out by Overseeing Organisation shall in accordance with the Preambles to Bill of Quantities General Directions include for:

- Item coverage
- (a) posts (as this Series paragraph 10);
  - (b) concrete foundations to posts (as this Series paragraph 13);
  - (c) socketed foundations to posts (as this Series paragraph 14);
  - (d) provision, maintenance and subsequent removal of reaction vehicle;
  - (e) removal of test posts and foundations;
  - (f) disposal of material (as Series 600 paragraph 39);
  - (g) reinstatement and making good;
  - (h) traffic safety and management (as Series 100 paragraph 26).