

## **General Specification for Building 2012 Edition – 1<sup>st</sup> Corrigendum.**

**The General Specification for Building 2012 Edition (GS 2012) is reviewed periodically to facilitate updating of the specification in a continuous process.**

**Corrigendum No. GS 2012 - 01 is issued on 1 August 2014 to incorporate amendments to the 2012 edition which are highlighted in the following pages.**

**After an introductory period of 3 months, GS 2012 with Corrigendum No. GS2012-01 shall apply to all tenders to be invited by ArchSD on or after 1 November 2014.**

**ARCHITECTURAL SERVICES DEPARTMENT**  
**GENERAL SPECIFICATION FOR BUILDING**  
**2012 EDITION**

Corrigendum No. GS 2012 – 01  
(Effective from 1 November 2014)

The following clauses and indexes are amended in the above edition of General Specification for Building.

Amendments to Section 1

- |                         |             |   |
|-------------------------|-------------|---|
| <b>Regulations</b>      | <b>1.11</b> | "Regulations" mean any Ordinance or Regulation published by Government of Hong Kong, byelaws of any local or duly constituted authority and rules or regulations of public bodies and companies which may be applicable to the Works.   |
| <b>Trees and shrubs</b> | <b>1.20</b> | <p>Provide a record of existing trees, if any, within and in close vicinity (within 2000 mm) of the site boundary and works areas. (A plant is considered as a tree if its trunk diameter measures 95 mm or more at a height of 1300 mm above the ground level. (Guidance on measurement of tree diameter is given in Agriculture, Fisheries and Conservation Department's Nature Conservation Practice Note No.2)) Photographic record and location plan for individual tree together with the Tree Schedule shall be submitted within 28 days after commencement of the Works or nomination by the SO. The Tree Schedule shall show the following particulars:</p> <ul style="list-style-type: none"><li>(a) A number identity for each tree, also marked on each photograph;</li><li>(b) The species (scientific names and Chinese common names);</li><li>(c) Trunk diameter (at 1300mm above the ground level);</li><li>(d) Tree crown spread;</li><li>(e) Overall height;</li><li>(f) Condition of the tree;</li><li>(g) Existing ground level at the root collar.</li></ul> |

Protect and preserve all existing trees and shrubs on Site. No physical disturbance including transplanting/felling/pruning of any existing tree shall be permitted without prior written consent of the SO and the statutory approval.

Take precaution and provide all necessary on-site protection works/measures (including tree surgery works if so required) for individual existing tree, if any, within or in close vicinity (within 2000 mm) of the site boundary and/or works area throughout the Contract period.

Temporary fencing, if necessary shall be provided to prevent the encroachment of equipment or materials and contamination of the surrounding ground by oil or other deleterious substances. Do not bank spoil, vegetable soil or other materials within the drip-line zone of individual trees. If it is necessary to trim or cut back trees and shrubs, it must be done under the direction and supervision of the SO in strict compliance with Clauses 2.37 to 2.41 and Section 25 of the G.S.

Make allowance in method of operation and vehicular access for tree preservation during the period of Works.

Amendments to Section 3

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|--------------------|-------------|---|
| <b>Definitions</b> | <b>3.01</b> | <ul style="list-style-type: none"><li>(i) (a) "Top soil" is soil capable of supporting vegetative growth.</li><li>(b) "Inert construction and demolition material" shall mean rock, rubble, earth, soil, concrete, asphalt, brick, tile and masonry generated from construction and demolition works.</li></ul> |
|--------------------|-------------|---|

- (ii) "Suitable material" shall be approved and to consist of naturally occurring or processed material, or inert construction and demolition material, which at the time of deposition is capable of being compacted in accordance with the specified requirements to form stable areas of fill. The soluble sulphate content of the material placed within 500 mm of concrete, cement bound material or cementitious material shall not exceed 1.9 grams of sulphate, expressed as SO<sub>3</sub>, per litre. The total sulphate content, expressed as SO<sub>3</sub>, of the material placed within 500 mm of metal work shall not exceed 0.5% by mass.

The method of testing of the total sulphate content shall be in accordance with **Geospec 3** - Model Specification for Soil Testing issued by the Geotechnical Engineering Office.

- (iii) "Unsuitable material" is material other than suitable material or containing the following:
- (a) Material susceptible to volume change, including marine mud, soil with a liquid limit exceeding 65% or a plasticity index exceeding 35%, swelling clays and collapsible soils,
  - (b) Peat, vegetation, timber, organic, soluble or perishable material,
  - (c) Dangerous or toxic material or material susceptible to combustion, or
  - (d) Metal, rubber, plastic or synthetic material.
- (iv) "Rock" is hard material which in the opinion of the SO can only be removed by the use of blasting, wedges or pneumatic drills and shall include individual boulders or other masses exceeding 0.20 m<sup>3</sup> in size.
- (v) (a) "Rock fill" shall consist of pieces of concrete or hard, durable rock of which, in the opinion of the SO, not more than 30% by mass is discoloured or shows other evidence of decomposition. Masonry, brick and similar materials shall not be used instead of rock unless permitted by the SO. No individual particle shall exceed 0.1 m<sup>3</sup> in size or the thickness of the filling whichever is the least, suitably graded for deposition and compaction in accordance with Clause 3.20.
- (b) "Recycled rock fill material" (Grade 200) shall be recycled rock or inert construction and demolition material which is hard and durable, and free from cracks, veins, and other evidence of decomposition.
- (vi) "Hardcore" shall comprise the following material to pass rings varying from 28 to 150 mm (from 28 to 200 mm for recycled rock fill), or else, single sized hardcore may be used:
- (a) Rock fill.
  - (b) Broken stone, hard brick, concrete or other comparable hard, inert, approved material. The material shall be free from dust, rubbish or deleterious foreign matter.
- (vii) "General filling material" shall be "suitable material". It may contain up to 25% rock distributed evenly throughout the whole mass of the material. General filling material shall contain no material exceeding 200 mm in size.

- (viii) "Special filling material" shall be "general filling material" capable of passing through a 75 mm BS sieve. The material shall be sampled and tested according to **Geospec 3**. The material shall have the following characteristics:
  - (a) Liquid limit shall not exceed 45%.
  - (b) Plasticity index shall not exceed 20%.
  - (c) Coefficient of uniformity shall be greater than 50.
  - (d) The percentage passing a 63 µm BS sieve shall be less than 45% by weight.
- (ix) "Embankment", "filling area" or "area of fill" means an area on the Site other than a foreshore or sea-bed where the ground level shall be raised by filling in layers as part of the Works.
- (x) "Trench excavation" means excavating from ground level not exceeding 5000 mm in width at surface.
- (xi) "Bulk excavation" means excavation in the open other than trench excavation.
- (xii) Well-graded material shall consist of material that has a coefficient of uniformity exceeding 10.
- (xiii) Uniform-graded material shall consist of material that has a coefficient of uniformity of 10 or less.

Note: The definitions of trench excavation and bulk excavation stated in sub-clauses (x) and (xi) are for the purposes of the GS only and do not apply to the measurement of excavation in Bills of Quantities which are measured in accordance with the current edition of the Standard Method of Measurement of Building Works for use in Hong Kong.

**Temporary works for earthworks 3.04**

Design the Temporary Works associated with earthworks, including temporary slopes, stockpiles and drainage, such that the risk of failure is not more than that which would be adopted if the Temporary Works were to be permanent. Allowance may be made in the design of the Temporary Works for the shorter design life and for the risk to persons and property and the surface water and groundwater conditions which may occur during construction.

**Earthwork 3.05**

- (i) Carry out excavation and earthwork in such a manner as to prevent erosion or slips. Limit working faces to safe slopes and height. Do not stockpile material where it might cause a landslide or failure of excavation face.
- (ii) Provide and maintain necessary temporary access roads and temporary drainage, and divert and subsequently reinstate permanent drainage systems. Submit proposed alignments and levels of temporary access roads for approval prior to their construction. Provide temporary roads with sufficient drainage ditches over their full length.
- (iii) Monitor weather forecasts to ensure awareness of impending heavy rain and inspect the site frequently during periods of sustained rainfall.
- (iv) Seal, cover with impermeable sheeting or protect by other methods approved by the SO, all excavation and earthwork at the cessation of the days work and

when heavy rain is expected.

- (v) Material handling and storage areas shall be levelled and well drained. Stockpiles of material shall be sprayed with water or a dust suppression chemical to minimize dust generation.
  - (vi) Carry out excavation and earthwork in the dry unless otherwise authorised by the SO. Carry out the formation of cuttings and filling in such a manner that the surfaces have at all times a sufficient minimum crossfall and, where practicable, a sufficient longitudinal gradient to enable them to shed water and prevent ponding. Adopt a method of working which exposes the minimum area of bare soil across the site. Follow up earthwork immediately with either approved temporary protection or the permanent surface protection and drainage work.
  - (vii) Rapidly disperse water, whether shed on to the excavation and earthwork, or arising from any other source including flowing into the Site from elsewhere. Provide temporary water courses, ditches, catchpits, drains, pumping or other means of maintaining excavation and earthwork free from water. Approval shall be sought from Drainage Services Department and Environmental Protection Department for the discharge of site effluent into permanent drainage system. Ensure temporary and permanent drainage systems are adequately maintained and clear of rubbish and debris.
  - (viii) Excavations for structures, pits and trenches shall not be carried out on or near slopes unless measures are taken to prevent water collecting in the excavation and running down the slope.
  - (ix) Install permanent drainage systems when practicable and proceed upwards from the low point.
- Generally**                      **3.08**
- (i) Carry out and adequately support excavation in such a manner to maintain excavations in a stable condition and to prevent settlement of structures or utilities due to excavation or dewatering. Constructional Plant or other vehicles shall not be operated or parked adjacent to excavations, and earthworks, materials or other materials shall not be placed adjacent to excavations unless this has been allowed for in the design of the Temporary Works for the support of the excavation.
  - (ii) Keep excavation free of water in accordance with Clause 3.05.
  - (iii) Neatly trim the face of excavation.
  - (iv) Carry out excavation to the lines, levels, dimensions and slopes specified.
  - (v) Carefully level the bottom of excavation and step or bench horizontally as specified. Remove any pockets of soft material or loose rock in the bottoms of pits and trenches and fill the resulting cavities and any large fissures with Grade 10 or higher grade concrete. Do not trim the side faces of excavations for at least 24 hours after placing any blinding concrete required by the Contract.
  - (vi) Backfill in accordance with the GS and at no extra cost "over-excavated" areas where the Contractor's proposed method of excavation, if approved, involves excavation in excess of that specified in certain areas.
  - (vii) Maintain excavated surfaces to be used for construction traffic at a level of 300 mm minimum above formation level unless in rock. Make good any

damage to the surface arising from such use with material having the same characteristics as the material which has been damaged.

- (viii) Ensure that no construction traffic uses an area once trimming to final formation level has commenced, with the exception of plant necessary for such trimming, and ensure that no damage is caused to the surface by this plant.
- (ix) Make good, at no extra cost, surfaces which, after excavation, have deteriorated to a condition that makes compaction of backfilling impracticable, either by carrying out additional excavation and filling in accordance with this GS or, by waiting until the condition of the exposed material is, in the opinion of the SO, fit to receive the approved backfill.
- (x) Excavate in such a manner that suitable material is kept separate and store in temporary spoil heaps to the satisfaction of the SO, where required for use in the Works without contamination by unsuitable material or deterioration. Where, in the opinion of the SO, suitable material has become contaminated by unsuitable material or has deteriorated, this material shall be removed from Site and replaced with suitable imported material at the Contractor's expense.
- (xi) Take necessary precautions to prevent damage to existing drains and services encountered in and around the excavation. Should any damage occur, notify the SO and the relevant authorities concerned immediately and make good at no extra cost. Temporarily divert ditches, land drains or other waterways encountered in the excavation and subsequently reinstate at the Contractor's expense.
- (xii) Take necessary precautions to prevent damage to tops of piles during excavation.
- (xiii) Bottoms of excavation shall be approved before any new work is laid. Inform the SO when excavation is ready for inspection. Do not trim and blind the bottom of excavation without approval.

**Obstructions            3.09**

Notify the SO of the location and nature of any buried obstruction encountered during excavation. Take up disused drains encountered in the excavation and clear away. Remove any contaminated earth. Disinfect as necessary and seal off ends with concrete. Break up and remove disused manholes and backfill where required with approved material properly compacted.

Break out and remove old walls, foundations, piles and other underground structures encountered in the excavation and backfill where required with approved material in accordance with the GS.

**Tolerance for excavation**

**3.11** Excavation shall be within the tolerances stated in Table 3.1 of the specified design profile.

TABLE 3.1

Tolerances for excavation final surfaces.

Type of surface	Tolerance for excavation except in rock (mm)		Tolerance for excavation in rock (mm)	
	+	-	+	-
Formations for foundation and utilities	0	25	0	150
Formations for pavements	0	50	0	150
Note: A positive tolerance refers to under excavation and a negative tolerance refers to over excavation.				

In case of cut slopes, the tolerance shall not exceed 75 mm measured at right angles to the batter.

**Surfaces of cutting**

**3.12** Remove from the side of rock cuttings any inferior stone or soft material intervening between layers of compact rock, or rock which, in the opinion of the SO, will not withstand the weather satisfactorily after exposure. Remove from sides of cuttings rock fragments which move when prized with a crow-bar. The depth from the face of cuttings to which material is to be removed will be determined by the SO. Build up the resulting space to the required profile with Grade 10 or higher grade concrete or masonry in cement mortar to the required profile using rock similar to the adjoining natural rock as instructed by the SO.

**Blasting**

**3.15** Do not use explosives except when specifically permitted by the Contract, or with prior approval of the SO.

Blasting operations and the supply, transportation, storage, use and disposal of explosives shall be in accordance with conditions and restrictions imposed by the Commissioner of Mines. The Contractor shall make all arrangements with, and obtain all licences and permits from, the Commissioner of Mines in connection with blasting operations.

Give the SO a minimum of 24 hours notice of a proposal to use blasting and give any details he may request concerning the charges, their positions, methods of monitoring the effects of blasting and protective measures. The SO may regulate, restrict or prohibit blasting if, in his opinion, it is necessary to do so for the safety of persons or property, to limit noise or to safeguard the Works. The approval of the SO shall be obtained for each location, or series of locations, where the Contractor wishes to use more than 10 kg of explosive in one blast.

- (i) Proposed blast-hole depth, diameter, spacing and orientation.
- (ii) Proposed type of explosive, charge weight and delay for each blast hole.

Adopt an approved pre-splitting technique for forming the final cut rock face.

Take responsibility for any delays arising from blasting operations.

**Surface preparation for fill material**      **3.16**

Clear natural ground or surface over which filling is to be placed of all soft spots, loose boulders, grass, top soil, bushes, trees, roots and other vegetation or rubbish. Do not place filling material until water-courses have been diverted or underdrained. Do not place fill on sloping ground until benches or trenches as described in Clause 3.17 have been completed.

**Filling**      **3.17**

- (i) Unless otherwise specified, filling including backfilling shall consist of general filling material obtained from excavation on Site, borrow areas or other approved sources.
- (ii) Provide for the SO's approval a method statement showing the sources of fill for each fill area, the Constructional Plant to be used for placing and the method of compaction.
- (iii) Commence filling works only when sufficient compaction plant is in operation at the place of deposition to ensure compliance with the requirements of Clauses 3.19 or 3.20.
- (iv) Fill material shall be deposited in layers of a thickness appropriate to the compaction method to be used. In deposition of fill material, ensure that a good bond is achieved between layers of fill, and unless otherwise directed by the SO, no material shall be placed on previously compacted layers unless the surface has been scarified or otherwise broken up and, if necessary, watered.
- (v) Blind the top surface of hardcore with fine graded filling material.
- (vi) Cut benches or trenches as shown on the drawings and as directed by the SO where filling shall be formed on sloping ground and provide any necessary under-draining of the affected part of the Site.
- (vii) Keep the fill area free of water in accordance with Clause 3.05.
- (viii) Obtain approval from the SO before commencing filling and before any fill layer is covered.
- (ix) Do not use "end tipping" in filling.
- (x) Leave surfaces with no area that can retain water at the end of each day's work and, if necessary, cut ditches to achieve this.
- (xi) Stop work when the state of the weather is such that, in the opinion of the SO, it will adversely affect the placing of compacted fill.
- (xii) Adopt one of the following procedures when material placed and compacted, or awaiting compaction, reaches a condition which, in the opinion of the SO, does not comply with the GS or has been damaged either by weather or in any other way:
  - (a) Remove the material from Site, replacing it with equivalent suitable



material.

- (b) Remove the material to stockpile until it is in a suitable condition for reuse.
- (c) Make good the material by mechanical or chemical means.
- (d) Cease work on the material until it is in a suitable physical condition for reuse.

Obtain approval from the SO before any of these options are adopted.

Remove, and adopt option (a) or (b) above for any material not complying with the GS that has been overlaid by more recently placed material.

- (xiii) Make good to the satisfaction of the SO settlement in filling and backfilling and any consequential damage that may occur up to the end of the Maintenance Period.

**Compaction by performance specification 3.19**

- (i) Agree with the SO the thickness of each layer which shall be compatible with the particular fill material and the specific compaction plant to be used. Carry out carefully control tests to determine the optimum placing thickness for the particular fill material and the number of passes to achieve the required density with the specific compaction plant to be provided. No permanent fill shall be placed until such compaction procedure and control tests results have been agreed with the SO. Earth moving plant will not be accepted as compaction equipment under this clause. Spread material in layers of uniform thickness and compact as soon as practicable after deposition.
- (ii) Test each class of material to be compacted in accordance with Clause 3.21 to determine its maximum dry density and moisture content.
- (iii) Not used.
- (iv) Carry out in-situ field density tests to determine the relative compaction in accordance with Clause 3.21 after compaction with the following arrangement:
  - (a) Test each layer and obtain approval from the SO prior to placing of the next layer, or
  - (b) Subject to the approval from the SO, tests for each layer may be performed after filling material in not more than 2 layers above have been deposited and compacted. If the results of any tests at lower layers do not comply with the specified requirements for relative compaction, the soil layer and all the layers above shall be re-compacted and tested with additional tests for relative compaction. The number of additional tests shall refer to Table 3.5. Further deposition of filling shall not be allowed unless all the underlying soil layer(s) have satisfied all the test requirements. No claim in respect of re-compaction and additional tests of the soil layer due to non-compliance of the soil underneath will be entertained.
- (v) The relative compaction (RC) of filling material shall be determined in accordance with the following equation:

$$RC = IDD/MDD \times 100\%$$

where:

- IDD is the in-situ dry density determined in accordance with Clause 3.21
- MDD is the maximum dry density determined in accordance with Clause 3.21
- (vi) Unless otherwise specified filling material shall be compacted to obtain the following relative compaction (RC):
  - (a) Fill within the 1.5 metres thick top surface zone of the platforms and fill within the 2.5 metres thick top surface zone of the peripheral slopes measured at right angles to the batter - RC of at least 95%.
  - (b) Interior of large fill platforms which do not or will not support structures - RC of at least 90%.
  - (c) Interior of large fill platforms supporting structures - RC of at least 95%.
  - (d) Fill immediately below road formation level - RC of at least 98% for a depth of 200 mm.
  - (e) Backfill to foundation pits or underneath suspended ground slab - RC of at least 90% or as agreed by the SO.

**Compaction by method specification 3.20**

Adoption of the method specification for controlling compaction to be carried out only with prior approval of the SO. Submit to the SO for approval a method statement covering particulars of the filling material, compaction layer thickness, specific compaction plant to be used, compaction procedure and the site control measures. Allow for control tests on the proposed method statement as required by the SO.

- (i) Spread and level each layer of rock fill or hardcore in accordance with Clause 3.23 (v) and systematically compact by at least 12 passes of a towed vibratory roller with a minimum static load per 100 mm width of roller of 1.75 kN or a grid roller with a minimum load per 100 mm width of roller of 7.8 kN or other plant approved by the SO.
- (ii) General fill material of which less than 90% passes a 20 mm BS test sieve shall be compacted to the following requirements:
  - (a) Spread and level each layer of general filling material with a thickness not less 1.5 times of the maximum size of the general fill material and not exceeding the maximum depth of compacted layer in accordance with Table 3.3. If there is a presence of over-sized coarse material in the general fill, the over-sized coarse material shall be removed or broken down to sizes acceptable to the SO. Each layer shall be systematically compacted by an approved vibratory roller with the stipulated minimum number of passes corresponding to the minimum static load per 100 mm width of the roller.

Blind the surface of rock fill or hardcore when specified with approved fine graded material.

TABLE 3.3

Compaction requirement for general fill material with a large portion of coarse material

Force per 100 mm width (kN)	Well-graded material		Uniform-grade material	
	Maximum depth of compacted layer (mm)	Minimum no. of passes	Maximum depth of compacted layer (mm)	Minimum no. of passes
0.25 – 0.45			150	16
0.46 – 0.70			150	12
0.71 – 1.25	125	12	150	10
1.26 – 1.75	150	8	200	10
1.76 – 2.30	150	4	225	10
2.31 – 2.80	175	4	150	10
2.81 – 3.50	200	4	275	8
3.51 – 4.20	225	4	300	8
4.21 – 4.90	250	4	300	8

**Test for determining the degree of compaction of compacted fill**

**3.21**

Arrange for tests specified below to be carried out by the personnel of the Public Works Laboratories (PWL), or if PWL not available by an approved independent testing firm when the prior approval of the SO has been obtained, using their own equipment and provide such labour and assistance as may be required.

- (i) Compaction tests shall be carried out on Site unless approved otherwise.
- (ii) Determine the maximum dry density and optimum moisture content in accordance with **Geospec 3**.

Test each soil type when first used and thereafter at the same time as every set of field density tests is carried out or whenever the SO may direct. Unless otherwise specified, the number of tests required shall be as stated in Table 3.4. Keep the records identifying the soil type and the location within the works.

- (iii) Determine the in-situ field density and moisture content in accordance with **Geospec 3** as directed by the SO to determine the relative compaction achieved.

Unless otherwise stated in the Contract, the number of tests required shall be as stated in Table 3.5. Keep records identifying the soil type and location in the Works and showing the following information for each series of tests:

- (a) Dry density of soil tested.
- (b) Moisture content.
- (c) Relative compaction achieved (%).
- (iv) Determine moisture content in accordance with moisture content tests under **Geospec 3** by means of a drying oven.

TABLE 3.4

*Number of samples for testing of optimum moisture content and maximum dry density*

<i>Description</i>	<i>Size of batch</i>	<i>No. of samples per batch</i>
<i>Special filling material</i>	<i>0 - 3000 m<sup>3</sup></i>	<i>3</i>
	<i>more than 3000 m<sup>3</sup></i>	<i>1 for each 1000 m<sup>3</sup> or part thereof</i>
<i>Filling material other than special filling material</i>	<i>0 - 15000 m<sup>3</sup></i>	<i>3</i>
	<i>more than 15000 m<sup>3</sup></i>	<i>1 for each 5000 m<sup>3</sup> or part thereof</i>
<p><i>Note: A batch is any quantity of filling material which is of the same type and which has similar properties, as determined by the SO.</i></p>		

TABLE 3.5

Number of samples for testing of moisture content  
and relative compaction

Description	Size of area of fill in batch	No. of samples No. of tests per batch
Areas of fill in excavations for structures, pits and trenches and on formations	0 - 100 m <sup>2</sup>	3
	more than 100 m <sup>2</sup>	2 for each 100 m <sup>2</sup> or part thereof
Other areas of fill	0 - 1 ha	4 for each 1000 m <sup>2</sup> or part thereof
	1 - 10 ha	3 for each 1000 m <sup>2</sup> or part thereof
	more than 10 ha	2 for each 1000 m <sup>2</sup> or part thereof
<p>Note: For the purpose of testing moisture content and relative compaction, a batch is any quantity of filling material which is of the same type and which is deposited in a single layer in any one location of fill presented by the Contractor for testing on one occasion.</p>		

**Generally 3.26**

Carry out preparation and surface treatment of the road formation after completion of any specified subgrade drainage and, unless otherwise agreed by the SO, immediately prior to laying the sub-base or the road-base where no sub-base is required. Follow the following sequence of operations :

- (i) Formations other than rock fill
  - (a) Remove all mud and slurry from surfaces below carriageways, lay-bys, cycle tracks, footpaths and hard-shoulders after general reinstatement of any soft areas.
  - (b) Compact surface by 4 passes of a smooth-wheeled roller having a load per 100 mm width of roller of 4.35 kN - 6.10 kN.
  - (c) Trim the formation.
  - (d) Roll the trimmed formation by 1 pass of a smooth-wheeled roller having a minimum load per 100 mm width of roller of 2.1 kN, or a vibratory roller having a minimum static load per 100 mm width of vibratory roller of 0.7 kN or a vibratory plate compactor having a minimum static pressure under the base plate of 13.8 kPa. Where the completed formation is not immediately covered with sub-base

material, protect it with a membrane of 65 to 80 µm impermeable plastic sheeting with 300 mm laps or other approved means to prevent ingress of moisture. If the moisture content of the accepted compacted material is allowed to reach a value above the maximum permitted for the material, allow the material to revert to an acceptable moisture content and, if directed by the SO, make good the surface at no extra cost by recompaction before laying the sub-base or road-base.

- (ii) Formations of rock fill:
  - (a) Trim and blind the formation in accordance with the requirements of Clause 3.23.
  - (b) Roll the trimmed formation as specified in Clause 3.26 (i)(d) above.

- (iii) Formations of rock cuttings :

Make good with lean concrete any surface irregularities under the formation which remain after trimming of rock excavation.

**Deposition of soil-cement fill**      **3.29**

- (i) Place soil-cement fill in its final position and compact within 30 minutes of the cement being added to the mix.
- (ii) Submit to the SO for prior approval a method statement covering the soil-cement fill materials, method of mixing, specific compaction plant to be used, compaction procedure and site control measures.

Amendments to Section 4

**Steel sheet pile sections**      **4.01**

Steel sheet piles shall be weldable structural steel to **BS EN 10248** Grade S270.

Steelwork and accessories for use in the system of lateral support shall be as Section 15 - Structural Steel Work.

Testing of steel sections and accessories shall be as Section 15 - Structural Steel Work.

Fabricate special and non-standard sheet piles including corner piles and junction piles from sheet pile sections approved for use in the Works.

Provide sheet piles in single continuous lengths unless otherwise specified.

Amendments to Section 5

**General**      **5.01**

- (i) Piles shall be Contractor designed unless otherwise specified.
- (ii) The approved types of piles that may be adopted by the Contractor unless otherwise specified are:
  - (a) Precast concrete piles.
  - (b) Precast prestressed tubular piles.
  - (c) Percussion cast in-situ concrete piles.
  - (d) Steel 'H' piles.

- (e) Non-percussion cast in-situ concrete piles.
  - (f) Large diameter bored piles.
  - (g) Hand-dug caissons.
  - (h) Mini piles.
  - (i) Rock-socketed Steel H-piles.
  - (j) Barrette piles.
  - (k) Any other piling systems approved by the Development Bureau.
- (iii) Support all loadings as specified with piles. Unless otherwise stated, all loads are acting at the geometric centres of columns and walls.
- (iv) In addition to the loads given in the loading schedule, weight of pile caps or backfill over the pile caps and the imposed load over the plan area of the pile caps, which shall be taken as 7.5 kN/m<sup>2</sup> unless specified otherwise, shall be included in the pile loading.
- (v) Design piles for the most critical loading generally produced from the following combinations:
- (a) Dead load + imposed load + soil and water load.
  - (b) Dead load + imposed load + soil and water load + wind load.
- NOTE: The theoretical safe loading capacity of piles in this case may be increased to 1.25 times the appropriate values as given in Clause 5.04.
- (c) 2/3 Dead load + Wind load + water uplift.
- (vi) Piles shall not be positioned directly under any wall opening as indicated on the drawing.
- (vii) No piles or portions of pile caps outside the Site boundary shall be permitted.
- (viii) The use of tension piles shall not be permitted unless otherwise stated.
- (ix) Carry out piling work in accordance with **Code of Practice for Foundations** published by Buildings Department.
- (x) The piling work shall be executed by a Contractor on the List of Approved Suppliers of Materials and Specialist Contractors for Public Works - Land Piling.
- (xi) The following works specified in the Contract shall be carried out by an independent Ground Investigation Contractor from Group I or Group II of the List of Approved Suppliers of Materials and Specialist Contractors for Public Works – Ground Investigation Field Work Category:
- (a) site borings to pre-determine the piles founding levels in accordance with Clause 5.19;
  - (b) pre-drilling for determination of pile length or to establish bedrock level;
  - (c) core drilling;

**Design  
submission**

**5.02**

- (d) proof drilling;
  - (e) other works as instructed by the SO.
- (i) Submit two copies of the following information:
- (a) A full specification of the piles proposed. Piles of the same size and material shall be designed and constructed to the same safe loading capacities irrespective of the actual design load sustained by each pile. Should the Contractor design the pile by adopting a theoretical safe loading capacity of pile less than the maximum value allowed in this specification, this lower theoretical safe loading capacity shall be used for the purpose of static loading test.
  - (b) A complete set of design calculations for the piles.
  - (c) The Gross Load of each pile is the total loading taken by the pile during the life of the superstructure and shall not exceed the theoretical safe loading capacity of the pile.
  - (d) The Nett Load of each pile which is the Gross Load less any other loads deemed appropriate in consideration of the sub-soil conditions (e.g. the Negative Skin Friction).
  - (e) A drawing showing the number, position and size of the piles, the estimated maximum and minimum gross lengths of the piles (i.e. distance from ground level to tip of piles) and the proposed pile cap layout.
- (ii) Where hand-dug caissons are proposed and unless otherwise specified submit the following additional details prepared and certified by a Registered Structural Engineer:
- (a) The design calculations of the caissons including the strength and workability of the concrete and details of admixtures and reinforcement.
  - (b) The design of caisson linings including design calculations and drawings showing the details of the linings including sizes, thickness, and the moulds, method of construction, jointing, reinforcement, strength of concrete, admixtures, method of insertion and withdrawal of the moulds. Concrete for caisson linings shall not be inferior to Grade 20 and the thickness of linings shall be a minimum of 75 mm. Lining concrete will not be considered in conjunction with the hearting concrete as load bearing.
  - (c) The method of executing the work, in particular, the mode of excavating the caisson shafts, dewatering (if any) and the placing of concrete. Prevent piping, loss of material and the like when selecting the method of construction.
- No lowering of ground water table level beyond the Site boundary shall be permitted and approved measures must be adopted to control and monitor ground water table levels unless otherwise expressly authorised by the SO.
- (iii) Obtain the agreement of the SO in writing to the matters referred to in items (i) and (ii) above before work commences. No piling works shall commence on site unless the design submissions are approved by the SO in writing.
- (iv) Submit as specified two copies of the following information certified by a Registered Structural Engineer when the Contractor is required to carry out design of pile caps and/or strap beams:



- (a) Complete set of calculation on the design of pile caps and strap beams, in compliance with **Code of Practice for the Structural Use of Concrete** issued by the Buildings Department.
- (b) Drawing showing the proposed pile cap layout and strap beams with levels, sizes and typical details.
- (v) Each load element (column or wall) shall be supported on individual pile cap. Combination of loads from individual elements supported by one large cap shall not be allowed unless otherwise noted.
- (vi) If hydraulic hammer is used in the project, the following shall apply:
  - (a) In addition to those stated in Clause 5.02 (i) above, submit two copies each of the following:
 

Details of piling equipment to be used which shall include the model number, hammer weight, drop height, and theoretical energy output etc.
  - (b) Unless approved otherwise by the SO, Hiley Formula shall be used in assessing the theoretical safe loading capacity of the piles proposed.
  - (c) The efficiency of drop of the hydraulic hammer used in the Hiley Formula shall be taken as 90% unless a higher value can be verified in accordance with Clause 5.14 (iv).

**Percussion piles 5.14**

- (i) Assess the safe loading capacity of the pile according to an approved dynamic formula, e.g. Hiley Formula. For the purpose of design calculation, the design factor of safety shall not be less than two.
- (ii) The design final penetration shall generally not be taken as less than 2.5 mm per blow. The set penetration of at least 10 blows shall be recorded on the Site during set. Where it is evident from ground investigation records that piles are founded on rock, or it can be demonstrated with PDA analysis that the driving stress at final set is greater than  $0.65 f_y$  for steel H-piles, the design final penetration may be taken as not less than 1.0 mm per blow. The pile shall not be considered to have attained the theoretical safe loading capacity should the penetration of any blow recorded be in excess of the design final penetration.
- (iii) If the Hiley Formula is used to calculate the loading capacity of a pile, the temporary compression of the pile and hammer cushions ( $C_c$ ) shall be taken as not less than 7.5 mm when the thickness of the hard wood packings at the pile head is 50 mm or less and the plastic hammer cushion is 200 mm thick or less (refer to Clause 5.18 for steel 'H' pile).
- (iv) The efficiency of the hammer ( $E_h$ ) and the coefficient of restitution of the hammer cushion ( $e$ ) shall be determined from/ verified by CAPWAP analysis of trial piles (at least 5 piles for each hammer – pile size – drop height combination). The combination of  $E_h$  and  $e$  shall be so chosen such that when these values are substituted into the Hiley Formula, the average of the predicted bearing capacity of the trial piles is not higher than 90% of the average CAPWAP capacity.
- (v) If reasonable values of design final set (not less than 2.5 mm or 1.0 mm per blow as the case may be) cannot be obtained from the Hiley Formula with  $E_h$  and  $e$  so chosen, all the piles falling into this category shall be subject to Dynamic Pile Test and CAPWAP analysis. The Contractor may also choose to carry out the Dynamic Pile Test in parallel with the final set measurement. The pile with the lowest CAPWAP capacity or any other pile selected by the SO for each batch of piles proposed by the Contractor for phased completion shall

be load tested for acceptance. All the cost incurred from the Dynamic Pile Tests, CAPWAP analyses and static load tests shall be borne by the Contractor.

- (vi) Drop hammer shall not be used for final set measurement. All final sets shall be taken with the hydraulic hammer.
- (vii) Driving of the last segment of pile shall normally be in one operation and final set taken accordingly. If, for some reasons, this cannot be done, the rate of penetration of the pile shall be recorded before stopping. When pile driving is resumed, it shall be driven to attain at least the previous rate of penetration before final set is taken.

#### Amendments to Section 9

**Concrete bricks and blocks**    **9.06**

Concrete bricks and blocks to be to **BS EN 771-3** & **BS EN 772-2**. The mean compressive strength to be not less than 7.0 MPa. Concrete bricks to be of the same size as clay bricks.

Concrete blocks to be of the thickness specified and other dimensions as approved.

Concrete bricks or blocks for fair face work to be "selected", being picked for evenness, texture and sharpness of arrises.

#### Amendments to Section 15

**Through thickness properties**    **15.18**

Ensure that where appropriate the steel material has adequate through thickness properties to satisfy the design, the method of fabrication, welding procedures and non-destructive inspection regime such that the material at, or adjacent to, welds is free of laminations, centreline segregation or other crack like indications on completion of welding.

Any material, which is specified or proposed by the Contractor to have enhanced through thickness properties, shall comply with the requirements of **BS EN 10164**. The Contractor shall, not less than three weeks prior to ordering the steel, submit a report to the SO which documents the strategy that will be adopted (in terms of material selection, weld procedure, procedure trials, weld sequence, shrinkage control and inspection regime) to ensure that the above criteria are satisfied.

If valid test reports issued by the manufacturer are not available, carry out the following additional tests by Public Works Laboratories or an approved independent HOKLAS accredited laboratory:

- (a) Ultrasonic grading to **BS EN 10160** Class S1 and **BS EN 10306** Table 2 Class 2.3 for flat products and sections respectively; and
- (b) Through-thickness tensile tests to **BS EN 10164**.

**Acceptance of welds**    **15.58**

Employ an approved independent HOKLAS accredited testing firm to carry out and interpret the inspection and testing of welds, and provide any necessary labour and attendance. Submit evidence proving that operators carrying out the inspection and testing have been trained and assessed for competence in the inspection and testing of welds. In addition, submit certificates of competence from a recognised authority for operators carrying out ultrasonic examination.

Arrange for the independent testing firm to submit a testing programme for the approval of the SO. Any welds that shall be rendered inaccessible by subsequent work shall be examined prior to the loss of access.

Visually inspect all welds in accordance with BS EN 970, and after visual inspection, carry out non-destructive testing in accordance with Table 15.6:

TABLE 15.6

Weld Type	Frequency of Non-destructive Testing
All types of butt welds	100% ultrasonic examination and magnetic particle inspection
Fillet welds with leg length exceeding and including 10 mm	20% ultrasonic examination and magnetic particle inspection
Fillet welds with leg length not exceeding 10 mm	20% magnetic particle inspection
Secondary attachment welds, e.g. for fixing purlins, side rails	5% of attachments by magnetic particle inspection and ultrasonic examination if leg length exceeds and includes 10 mm

The standard of acceptance for welds shall be in accordance with Table 14.3b in the Code of Practice for the Structural Use of Steel issued by the Buildings Department.

Carry out surface flaw detection by magnetic particle inspection (MPI) in accordance with BS EN 1290. If MPI is impractical, dye penetration inspection (DPI) may be used, subject to the approval of the SO, in accordance with BS EN 571.

Carry out ultrasonic examination in accordance with BS EN 1714 Level B. Make printout results available during ultrasonic examination on site at 3 specified locations per weld (such as at both ends and in the middle of the weld) and at positions in question.

The independent testing firm shall submit test reports directly to the SO in sealed envelopes within 3 days of the completion of the testing. Tests revealing discontinuity shall be reported separately from the subsequent repair and re-test.

Unless approved otherwise by the SO, carry out all non-destructive testing not less than 16 hours from the time of completion of the weld to be inspected, or not less than 40 hours in case of butt welds thicker than 40 mm or any welds to S450J0 steel. Should test results indicate that welds are below the standard of acceptance, carry out at the Contractor's own expense approved remedial measures and further acceptance tests.

#### Amendments to Section 26

#### **Performance test 26.42**

Carry out performance tests on selected permanent soil nails as directed by the SO. Each group of soil nails of the same type and those grouted in one day shall be tested. The number of performance tests to be carried out shall be 6% of the total number of permanent soil nails (in any case at least one) in the group. The apparatus for measuring loads and deformation shall have an accuracy of  $\pm 2$  kN and  $\pm 0.05$  mm respectively. Test and calibrate the apparatus by approved laboratories not more than 3 months prior to the date of carrying out of the tests. The following procedure for performance tests shall be adopted:

- (a) Do not carry out the performance test until the grout has reached a cube strength of 21 MPa.
- (b) The test load ( $T_p$ ) shall be  $(1.0 + \text{designed minimum factor of safety against pullout failure at soil-grout interface})/2$  times the working load required, which shall not be greater than 80% of the yield stress of the steel bar forming the soil nail.
- (c) Apply an initial load ( $T_a$ ) equal to 20% of  $T_p$ .
- (d) Then load the soil nail up to  $T_p$  as specified in GS Clause 26.42(b) and maintain the loading for 20 minutes. Take measurements of the deformation

with the load held constant at time interval of 1, 2, 3, 5, 6, 10, and 20 minutes. If the nail deformation between 1 minute and 10 minutes exceeds 1 mm or the deformation in the last 10 minutes exceeds 0.05mm, hold the maximum test load  $T_p$  for an additional 40 minutes and record deformations at 30, 40, 50, and 60 minutes. If the deformation in the last 10 minutes exceeds 0.05mm, the load shall be held longer as directed by the SO.

- (e) Reduce the load to  $T_a$  and the extension recorded. Then unload the soil nail as well as that of the bearing plate.
- (f) Throughout the test, the deformation of the soil nail as well as that of the bearing plate versus the applied load shall be measured and recorded in a format as shown on Sheet 4 of Appendix 5, unless otherwise approved by the SO. Submit the results to the SO within 3 days after completion of the test.
- (g) A soil nail shall be considered as failed if,
  - (i) It is pulled out before or after the maximum allowable test load  $T_p$  as specified in GS Clause 26.42(b) is reached, or
  - (ii) The nail deformation between 6 minutes and 60 minutes at the maximum allowable test load  $T_p$  exceeds 2 mm, or
  - (iii) The soil nail head movement has exceeded  $e_f$  in which

$$e_f = T_p L / (EA) + 5mm$$

where

- $T_p$  = Test load in performance test as specified in GS Clause 26.42(b)
- $L$  = Total length of soil nail
- $A$  = Cross sectional area of steel bar
- $E$  = Young's modulus of steel bar

Report the failure to the SO immediately.

- (h) For any one failure of performance test, select two additional soil nails from the group and carry out further performance tests. If either one of these 2 additional soil nails also fails to reach the test load specified in Clause 26.42(b) above, the particular group of soil nails shall be considered as not complying with the specified requirements.

**Soil-cement**

**26.66**

- (a) Soil-cement shall consist of Portland Cement (PC), sand and inorganic soil in the proportions 1:3:12 by mass unless otherwise stated. The mix proportion of soil-cement is 1:3:40 by mass when it is applied to the top layer (maximum 300 mm thick) or other areas as directed or agreed by the SO.
- (b) PC shall comply with Clause 6.27.
- (c) Sand shall comply with **BS 1199** and **BS 1200**.
- (d) Inorganic soil shall be free from organic matter and shall contain not more than 30% of soil particles passing a 63  $\mu$ m BS test sieve.

**Mixing soil-cement**

**26.67**

Mix thoroughly soil-cement in a concrete mixer; hand-mixing of small quantities of soil-cement may be permitted by the SO.

<b>Deposition and compaction of soil-cement fill</b>	<b>26.68</b>	<ul style="list-style-type: none"> <li>(a) Place soil-cement fill in its final position and compact within 30 minutes of the cement being added to the mix.</li> <li>(b) Compact soil-cement fill as stated in Clause 3.19 to obtain a relative compaction of at least 95% throughout.</li> </ul>
<b>Maintenance stairways on slope</b>	<b>26.69</b>	<ul style="list-style-type: none"> <li>(a) Typical details of concrete maintenance stairways on slopes up to 40° are as shown in Standard Drawings in Appendix 9.</li> <li>(b) Typical details of staircase for slopes steeper than 40° are as shown in the Standard Drawing in Appendix 9.</li> </ul>
<b>Particular requirements</b>	<b>26.70</b>	<p>Submit as-built topographical survey, site formation layout, details drawings and design calculation to the SO, and they shall cover the following:</p> <ul style="list-style-type: none"> <li>(a) the extent of man-made slopes, if any (including cut and fill slopes) is to be marked on the as-built drawings. The legend for cut slopes shall be different from that of the fill slopes;</li> <li>(b) the contour lines shall terminate at the boundaries of the cut/fill slopes and there shall not be any contour lines within the cut/fill slopes;</li> <li>(c) any surface protection such as hydroseeding, sprayed concrete, chunam, etc. and surface drainage system shall be marked clearly on the as-built drawings;</li> <li>(d) any installation such as soil nails, dowel bars, horizontal drains, etc. shall also be marked on the as-built drawings. The respective grouting and testing records shall also be submitted. The elevation of the respective slopes shall be shown;</li> <li>(e) any retaining walls layout and details; and</li> <li>(f) any other geotechnical features.</li> </ul>

**GENERAL SPECIFICATION FOR BUILDING 2012 EDITION**

**Major Changes from GS 2012 (November, 2012) to Corrigendum No. GS 2012-01 (November, 2014)**

Clause No.	Sub-heading of Clause	Major Changes
<b>Section 1 - Preliminaries</b>		
<b>1.11</b>	<b>Regulations</b>	Add "of Hong Kong" after the word "Government".
<b>1.20</b>	<b>Trees and shrubs</b>	Change "Clause 2.10" to "Clauses 2.37 to 2.41".
<b>Section 3 – Excavation and Earthwork</b>		
<b>3.01</b>	<b>Definitions</b>	<p>Rename sub-clause (i) to (i)(a).</p> <p>Insert sub-clause (i)(b) " "Inert construction and demolition material" shall mean rock, rubble, earth, soil, concrete, asphalt, brick, tile and masonry generated from construction and demolition works."</p> <p>Replace sub-clause (ii) "processed material which at the time of deposition" with "processed material, or inert construction and demolition material, which at the time of deposition".</p> <p>Rename sub-clause (v) to (v)(a).</p> <p>Replace sub-clause (v)(a) "pieces of hard, durable" with "pieces of concrete or hard, durable".</p> <p>Insert sub-clause (v)(b) " "Recycled rock fill material" (Grade 200) shall be recycled rock or inert construction and demolition material which is hard and durable, and free from cracks, veins, and other evidence of decomposition."</p> <p>Insert sub-clause (xii) "Well-graded material shall consist of material that has a coefficient of uniformity exceeding 10."</p> <p>Insert sub-clause (xiii) "Uniform-graded material shall consist of material that has a coefficient of uniformity of 10 or less."</p>
<b>3.04</b>	<b>Temporary works for earthworks</b>	Replace "are likely to occur" with "may occur".
<b>3.05</b>	<b>Earthwork</b>	Add to the end of sub-clause (i) "or failure of excavation face".
<b>3.08</b>	<b>Generally</b>	<p>Replace sub-clause (v) "Grade 10 concrete" with "Grade 10 or higher grade concrete".</p> <p>Replace sub-clause (xi) "When so instructed, temporarily divert ditches, land drains ... in the excavation and subsequently reinstate." with "Temporarily divert ditches, land drains ... in the excavation and subsequently reinstate at the Contractor's expense."</p>
<b>3.09</b>	<b>Obstructions</b>	Replace at the end of the last paragraph "with approved material properly compacted." with "with approved material in accordance with the GS."
<b>3.12</b>	<b>Surfaces of cutting</b>	Replace "Grade 10 concrete" with "Grade 10 or higher grade concrete".
<b>3.15</b>	<b>Blasting</b>	Replace at the 2nd paragraph "by the Mines Division of Civil Engineering and Development Department." with "by the Commissioner of Mines."

3.16	<b>Surface preparation for fill material</b>	Replace “Clear natural ground over which filling shall be placed” with “Clear natural ground or surface over which filling is to be placed”.
3.17	<b>Filling</b>	Replace sub-clause (ii) “Provide a method statement” with “Provide for the SO’s approval a method statement”.
3.19	<b>Compaction by performance specification</b>	<p>Replace sub-clause (i) “with compaction plant used. Carry out carefully controlled tests to determine the optimum placing thickness for the particular fill and the number of passes to achieve the required density with the compaction plant provided. No permanent fill shall be placed until such tests have been agreed with the SO.” with “with the particular fill material and the specific compaction plant to be used. Carry out carefully control tests to determine the optimum placing thickness for the particular fill material and the number of passes to achieve the required density with the specific compaction plant to be provided. No permanent fill shall be placed until such compaction procedure and control tests results have been agreed with the SO.”.</p> <p>Replace sub-clause (iii) “The moisture content of the in-situ material during compaction shall be within <math>\pm 3\%</math> of the optimum moisture content determined in accordance with Clause 3.21. Add water to soil in the stockpile if required before spreading in layers.” with “Not Used”.</p> <p>Replace sub-clause (iv) “... after compaction. Test each layer and obtain approval from the SO prior to placing of the next layer” with “after compaction with the following arrangement:  (a) Test each layer and obtain approval from the SO prior to placing of the next layer, or  (b) Subject to the approval from the SO, tests for each layer may be performed after filling material in not more than 2 layers above have been deposited and compacted. If the results of any tests at lower layers do not comply with the specified requirements for relative compaction, the soil layer and all the layers above shall be re-compacted and tested with additional tests for relative compaction. The number of additional tests shall refer to Table 3.5. Further deposition of filling shall not be allowed unless all the underlying soil layer(s) have satisfied all the test requirements. No claim in respect of re-compaction and additional tests of the soil layer due to non-compliance of the soil underneath will be entertained.”.</p> <p>Replace sub-clause (vi)(e) “Backfill to foundation pits - RC of at least 90%.” with “Backfill to foundation pits or underneath suspended ground slab - RC of at least 90% or as agreed by the SO.”.</p>
3.20	<b>Compaction by method specification</b>	<p>Replace 1<sup>st</sup> paragraph “Adoption of the method specification for controlling compaction to be carried out only under exceptional circumstances and with approval of the SO.” with “Adoption of the method specification for controlling compaction to be carried out only with prior approval of the SO. Submit to the SO for approval a method statement covering particulars of the filling material, compaction layer thickness, specific compaction plant to be used, compaction procedure and the site control measures. Allow for control tests on the proposed method statement as required by the SO.”.</p> <p>Replace sub-clause (i) “each layer of general filing material, rock fill ... or other approved plant.” with “each layer of rock fill ... or other plant approved by the SO.”.</p> <p>Insert sub-clause (ii) “ General fill material of which less than 90% passes a 20 mm BS test sieve shall be compacted to the following requirements:  (a) Spread and level each layer of general filling material with a thickness not less 1.5 times of the maximum size of the general fill material and not</p>

		<p>exceeding the maximum depth of compacted layer in accordance with Table 3.3. If there is a presence of over-sized coarse material in the general fill, the over-sized coarse material shall be removed or broken down to sizes acceptable to the SO. Each layer shall be systematically compacted by an approved vibratory roller with the stipulated minimum number of passes corresponding to the minimum static load per 100 mm width of the roller.”</p> <p>Delete from the last paragraph “Compact general filling material, rock fill or hardcore to the requirements of Clause 3.19 where, in the opinion of the SO, it contains sufficient soft material.”.</p> <p>Add the following table to the end of the last paragraph:</p> <p style="text-align: center;"><b>TABLE 3.3</b> Compaction requirement for general fill material with a large portion of coarse material</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Force per 100 mm width (kN)</th> <th colspan="2">Well-graded material</th> <th colspan="2">Uniform-grade material</th> </tr> <tr> <th>Maximum depth of compacted layer (mm)</th> <th>Minimum no. of passes</th> <th>Maximum depth of compacted layer (mm)</th> <th>Minimum no. of passes</th> </tr> </thead> <tbody> <tr> <td>0.25 – 0.45</td> <td></td> <td></td> <td>150</td> <td>16</td> </tr> <tr> <td>0.46 – 0.70</td> <td></td> <td></td> <td>150</td> <td>12</td> </tr> <tr> <td>0.71 – 1.25</td> <td>125</td> <td>12</td> <td>150</td> <td>10</td> </tr> <tr> <td>1.26 – 1.75</td> <td>150</td> <td>8</td> <td>200</td> <td>10</td> </tr> <tr> <td>1.76 – 2.30</td> <td>150</td> <td>4</td> <td>225</td> <td>10</td> </tr> <tr> <td>2.31 – 2.80</td> <td>175</td> <td>4</td> <td>150</td> <td>10</td> </tr> <tr> <td>2.81 – 3.50</td> <td>200</td> <td>4</td> <td>275</td> <td>8</td> </tr> <tr> <td>3.51 – 4.20</td> <td>225</td> <td>4</td> <td>300</td> <td>8</td> </tr> <tr> <td>4.21 – 4.90</td> <td>250</td> <td>4</td> <td>300</td> <td>8</td> </tr> </tbody> </table>	Force per 100 mm width (kN)	Well-graded material		Uniform-grade material		Maximum depth of compacted layer (mm)	Minimum no. of passes	Maximum depth of compacted layer (mm)	Minimum no. of passes	0.25 – 0.45			150	16	0.46 – 0.70			150	12	0.71 – 1.25	125	12	150	10	1.26 – 1.75	150	8	200	10	1.76 – 2.30	150	4	225	10	2.31 – 2.80	175	4	150	10	2.81 – 3.50	200	4	275	8	3.51 – 4.20	225	4	300	8	4.21 – 4.90	250	4	300	8
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<b>3.21</b>	<b>Test for determining the degree of compaction of compacted fill</b>	<p>Replace in the 1<sup>st</sup> paragraph “or by an approved independent testing firm” with “or if PWL not available by an approved independent testing firm” .</p> <p>Delete from the 2<sup>nd</sup> paragraph of sub-clause (iii) “Test each layer and obtain approval from the SO before the next layer is placed.”.</p>																																																						
<b>3.29</b>	<b>Deposition of soil- cement fill</b>	<p>Replace sub-clause (ii) “Compact soil-cement fill as stated in Clause 3.19 to obtain a relative compaction of at least 95% throughout.” with “Submit to the SO for prior approval a method statement covering the soil-cement fill materials, method of mixing, specific compaction plant to be used, compaction procedure and site control measures.”.</p>																																																						
<b>Section 4 – Steel Sheet Piling Work</b>																																																								
<b>4.01</b>	<b>Steel sheet pile sections</b>	<p>Replace “BS EN 10025 Grade S275” with “BS EN 10248 Grade S270”.</p>																																																						
<b>Section 5 – Piling Work</b>																																																								
<b>5.01</b>	<b>General</b>	<p>Replace sub-clause (iv) with “In addition to the loads given in the loading schedule, the weight of pile caps or backfill over the pile caps and the imposed load over the plan area of the pile caps, which shall be taken as 7.5 kN/m<sup>2</sup> unless specified otherwise, shall be included in the pile loading.”.</p>																																																						



		<p>Replace sub-clause (v) with “Design piles for the most critical loading generally produced from the following combinations:</p> <p>(a) Dead load + imposed load + soil and water load.</p> <p>(b) Dead load + imposed load + soil and water load + wind load.</p> <p>NOTE: The theoretical safe loading capacity of piles in this case may be increased to 1.25 times the appropriate values as given in Clause 5.04.</p> <p>(c) 2/3 Dead load + Wind load + water uplift.”.</p>
<b>5.02</b>	<b>Design submission</b>	<p>Delete “Under no circumstances shall the efficiency of drop be greater than 98%” in sub-clause (vi)(c).</p> <p>Delete sub-clause (vi)(d) “Subject to Clause 5.14(iv), the coefficient of restitution shall not be taken as greater than 0.65”.</p>
<b>5.14</b>	<b>Percussion piles</b>	<p>Replace “0.7fy” with “0.65fy” in sub-clause (ii).</p> <p>Replace “85%” with “90%” in sub-clause (iv).</p> <p>Add “The Contractor may also choose to carry out the Dynamic Pile Test in parallel with the final set measurement.” to the end of the first sentence of sub-clause (v).</p>
<b>Section 9 – Brickwork and Blockwork</b>		
<b>9.06</b>	<b>Concrete bricks and blocks</b>	Add a full stop after “ <b>BS EN 771-3 &amp; BS EN 772-2</b> ”.
<b>Section 15 – Structural Steel Work</b>		
<b>15.18</b>	<b>Through thickness properties</b>	Replace sub-clause 15.18(a) with “Ultrasonic grading to BS EN 10160 Class S1 and BS EN 10306 Table 2 Class 2.3 for flat products and sections respectively; and”.
<b>15.58</b>	<b>Acceptance of welds</b>	Replace “Grade 55” with “S450J0” in the last paragraph.
<b>Section 26 – Geotechnical Works on Soil and Rock Slopes</b>		
<b>26.42</b>	<b>Performance test</b>	<p>Replace sub-clause 26.42(b) with “The test load (<math>T_p</math>) shall be (1.0 + designed minimum factor of safety against pullout failure at soil-grout interface)/2 times the working load required, which shall not be greater than 80% of the yield stress of the steel bar forming the soil nail.”.</p> <p>Replace sub-clause 26.42(d) with “Then load the soil nail up to <math>T_p</math> as specified in GS Clause 26.42(b) and maintain the loading for 20 minutes. Take measurements of the deformation with the load held constant at time interval of 1, 2, 3, 5, 6, 10, and 20 minutes. If the nail deformation between 1 minute and 10 minutes exceeds 1 mm or the deformation in the last 10 minutes exceeds 0.05mm, hold the maximum test load <math>T_p</math> for an additional 40 minutes and record deformations at 30, 40, 50, and 60 minutes. If the deformation in the last 10 minutes exceeds 0.05mm, the load shall be held longer as directed by the SO.”.</p> <p>Replace sub-clause 26.42(g) with “A soil nail shall be considered as failed if,</p>

		<p>(i) It is pulled out before or after the maximum allowable test load <math>T_p</math> as specified in GS Clause 26.42(b) is reached, or</p> <p>(ii) The nail deformation between 6 minutes and 60 minutes at the maximum allowable test load <math>T_p</math> exceeds 2 mm, or</p> <p>(iii) The soil nail head movement has exceeded <math>e_f</math> in which</p> $e_f = T_p L / (EA) + 5mm$ <p>where</p> <p><math>T_p</math> = Test load in performance test as specified in GS Clause 26.42(b)</p> <p><math>L</math> = Total length of soil nail</p> <p><math>A</math> = Cross sectional area of steel bar</p> <p><math>E</math> = Young's modulus of steel bar</p> <p>Report the failure to the SO immediately.”.</p>
<b>26.66 (New)</b>	<b>Soil-cement</b>	<p>Add new Clause 26.66 as follows:</p> <p>(a) Soil-cement shall consist of Portland Cement (PC), sand and inorganic soil in the proportions 1:3:12 by mass unless otherwise stated. The mix proportion of soil-cement is 1:3:40 by mass when it is applied to the top layer (maximum 300 mm thick) or other areas as directed or agreed by the SO.</p> <p>(b) PC shall comply with Clause 6.27.</p> <p>(c) Sand shall comply with <b>BS 1199</b> and <b>BS 1200</b>.</p> <p>(d) Inorganic soil shall be free from organic matter and shall contain not more than 30% of soil particles passing a 63 <math>\mu</math>m BS test sieve.</p>
<b>26.67 (New)</b>	<b>Mixing soil-cement</b>	<p>Add new Clause 26.67 as follows:</p> <p>Mix thoroughly soil-cement in a concrete mixer; hand-mixing of small quantities of soil-cement may be permitted by the SO.</p>
<b>26.68 (New)</b>	<b>Deposition and compaction of soil-cement fill</b>	<p>Add new Clause 26.68 as follows:</p> <p>(a) Place soil-cement fill in its final position and compact within 30 minutes of the cement being added to the mix.</p> <p>(b) Compact soil-cement fill as stated in Clause 3.19 to obtain a relative compaction of at least 95% throughout.</p>
<b>26.69</b>	<b>Maintenance stairways on slope</b>	Original Clause 26.66 renumbered as Clause 26.69.
<b>26.70</b>	<b>Particular requirements</b>	Original Clause 26.67 renumbered as Clause 26.70.