

**THE GOVERNMENT OF THE  
HONG KONG SPECIAL ADMINISTRATIVE REGION**

**STANDARD METHOD OF MEASUREMENT**

**FOR**

**CIVIL ENGINEERING WORKS**

**1992 EDITION**

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## **FOREWORD**

This Method of Measurement lays down the method and criteria for the measurement of civil engineering works undertaken for the Hong Kong Government. It supersedes "Government of Hong Kong, Standard Method of Measurement, 1988 Edition".

The Method of Measurement is to be cited as "Standard Method of Measurement for Civil Engineering Works, 1992 Edition (Hong Kong Government)". It is compatible with the "General Conditions of Contract for Civil Engineering Works, 1990 Edition (Hong Kong Government)" and "General Specification for Civil Engineering Works, 1992 Edition (Hong Kong Government)". Where necessary, it should be supplemented by a Particular Preamble.

The Method of Measurement revises and updates the 1988 edition, mainly to take account of changes that became necessary due to the publication of the 1992 edition of the General Specification. The overall co-ordination for the document, and its final editing and production, were the responsibility of the Standards Unit of the Civil Engineering Department.

April 1992

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## PART I

### DEFINITIONS

1. In this document entitled "Standard Method of Measurement for Civil Engineering Works", 1992 Edition (Hong Kong Government), (hereinafter referred to as the "Method of Measurement"), the following words and expressions shall have the meanings hereby respectively assigned to them :
  - (a) "Bills of Quantities" means a list of items giving brief identifying descriptions and estimated quantities of the works to be performed;
  - (b) "Daywork" means the method of valuing work on the basis of the time spent by the workmen, the materials used and the plant employed;
  - (c) "Provisional Item" means an item describing work, the requirement for which is uncertain at the time the tender documents are issued and which can only be carried out on instruction of the Engineer;
  - (d) "Preliminary Item" means an item in respect of works and/or general obligations and risks antecedent to or involved in the execution of the Contract and which is set out either in a "Preliminaries" section of the Bills of Quantities and relating to the Works as a whole or under a "Special Preliminaries" sub-heading in any other section of the Bills of Quantities;
  - (e) "Existing ground surface" means the surface of the ground before any work under the Contract has been carried out;
  - (f) "Artificial hard material" means brickwork, concrete, reinforced concrete, masonry, bituminous paving and any other artificial material of a similar nature and which necessitates the use of pneumatic tools or other similar methods for its removal;
  - (g) "Rock" is naturally occurring hard material whose geological nature is to be regarded as such and which necessitates the use of blasting or pneumatic tools or other similar quarrying methods for its removal;
  - (h) "Soft spot" is a volume of earthwork material which is not stated in the Contract to be excavated but which in the opinion of the Engineer has inadequate strength, durability or stability.
2. Words and expressions to which meanings are assigned in the Conditions of Contract have the same meanings in the Method of Measurement.
3. Words and expressions to which meanings are assigned in the Specification and Drawings referred to in the Conditions of Contract have the same meanings in the Method of Measurement.

## **PART II**

### **GENERAL PRINCIPLES**

1. The Bills of Quantities are intended in the first instance to give information upon which tenders can be obtained. When a contract has been entered into, the function of priced Bills of Quantities is to provide for the valuation of the work executed.
2. The sub-headings and item descriptions used in the Bills of Quantities identify the work covered by the respective items, but the exact nature and extent of the work to be performed is to be ascertained by reference to the Drawings, Specification and Conditions of Contract, as the case may be, in conjunction with the matters listed against the relevant marginal headings "Item coverage" in Part V. The rates to be inserted in the Bills of Quantities shall be deemed to be the full inclusive value for the work covered by the respective items and as covering all labour, materials, temporary work, plant, overhead charges and profit, as well as the general liabilities, obligations and risks arising out of the Contract.
3. Each item description is to be consistent with and be compounded from one or more of the descriptive features listed in the itemisation groups in the various sections of Part V, as many of these groups or features being used as may be necessary to identify the work required, but not more than one feature from any one group may be represented in any one item description. Where the Method of Measurement does not identify the work required, it shall be amended as appropriate (see Part III, paragraph 10).
4. Unless expressly stated otherwise in the Contract, the Bills of Quantities are to contain all those items compounded in accordance with the foregoing paragraph 3 required to comprise the Works (apart from Provisional Sums and Prime Cost Items which may be required).

## PART III

### RULES FOR PREPARING BILLS OF QUANTITIES

**General**

1. The Bills of Quantities shall comprise the following :
  - General and Particular Preambles
  - Bill Number 1 : Preliminaries )
  - Bill Number 2 : )
  - : )
  - : ) See below
  - Bill Number : )
  - Bill Number : Daywork )
  - Bill Number : Provisional and Prime Cost Sums )
  - Grand Summary )

Separate bills shall be prepared for works of different nature, location, date of commencement, time for completion or any other circumstance which may give rise to different considerations of cost. The items in each bill shall be grouped into the appropriate sections of Part V of the Method of Measurement in the order shown therein.

**Units of measurement**

2. The following unit abbreviations shall be used :

Unit	Abbreviation
Millimetre	mm
Metre	m
Square millimetre	mm <sup>2</sup>
Square metre	m <sup>2</sup>
Hectare	ha
Cubic metre	m <sup>3</sup>
Kilogram	kg
Tonne	t
Number	nr
Hour	h
Week	wk
Month	nth

**Quantities**

3. The quantities shall be computed net from the Drawings, unless directed otherwise by a measurement rule in the Method of Measurement or by the Contract, and no allowance shall be made for bulking, shrinkage or waste. Quantities may be rounded up or down where appropriate. Fractional quantities are not generally necessary but, where required, should not be given to more than one place of decimals.

**Materials supplied to the Contractor**

4. Where the Contractor is to be supplied with materials on Site or where he is to collect materials from a designated source, it should be so stated in the item description in the Bills of Quantities.

- Marine work and work affected by non-tidal open water or tidal water***
5. Any work not covered by the Marine Works Section, such as piling and concrete work, and which is affected by non-tidal open water, such as reservoirs or rivers, or tidal water, shall be measured separately in accordance with the relevant sections of the Method of Measurement and described under a sub-heading as being affected by non-tidal open water or tidal water.
- The extent of the work measured as being affected by non-tidal open water or tidal water should be clearly defined in the Contract.
- Plant used on daywork***
6. Separate items should be provided for Provisional Sums and percentage adjustment thereto for different categories of plant used on daywork in accordance with the relevant sections of the "HKCA Schedules For Plant Used in Dayworks Carried Out Incidental to Contract Work".
- Prime Cost Sums***
7. Where Prime Cost Sums are included in the Bills of Quantities for the execution of work to be carried out by a Nominated Sub-contractor, separate items are to be provided for :
- (i) General Attendance provided by the Contractor in connection therewith in the form of a lump sum;
  - (ii) Special Attendance provided by the Contractor (if required) in the form of a lump sum;
  - (iii) the Contractor's profit and overheads in the form of a percentage.
- Where Prime Cost Sums are included in the Bills of Quantities for materials or goods to be supplied by a Nominated Sub-contractor, a separate item shall be provided for the Contractor's profit and overheads on the Prime Cost Sum, in the form of a percentage.
- Contingency Sum***
8. A Contingency Sum, if required, shall be given in the Grand Summary following the total of the amounts brought forward from the summary of each section of the Bills of Quantities.
- Adjustment Item***
9. An item described as the Adjustment Item shall be given in the Grand Summary following the total of the amounts brought forward from the summaries and the Contingency Sum.
- Amendments to the Method of Measurement***
10. Any methods of measurement which have been adopted in the preparation of the Bills of Quantities and which are not in accordance with or included in the Method of Measurement shall be stated in a Particular Preamble to the Bills of Quantities.
- Sketches***
11. Where necessary, the Method of Measurement should be amplified by sketches which shall form part of the Particular Preambles.
- Preambles to the Bills of Quantities***
12. The General Preambles on the following pages shall be reproduced in the Bills of Quantities followed by any Particular Preambles.



## PART IV

### PREAMBLES TO THE BILLS OF QUANTITIES

#### GENERAL PREAMBLES

***Method of  
Measurement***

1. These Bills of Quantities have been prepared in accordance with the procedures set forth in the Standard Method of Measurement for Civil Engineering Works, 1992 Edition (Hong Kong Government), hereinafter referred to as the "Method of Measurement".

***General directions***

2. In these Bills of Quantities, the sub-headings and item descriptions identify the work covered by the respective items, but the exact nature and extent of the work to be performed is to be ascertained by reference to the Drawings, Specification and Conditions of Contract, as the case may be, in conjunction with the matters listed against the relevant marginal headings "Item coverage" in Part V of the Method of Measurement. The rates inserted in the Bills of Quantities shall be deemed to be the full inclusive value of the work covered by the respective items, including but not limited to the following, unless expressly stated otherwise :
  - (i) provision of labour and costs in connection therewith;
  - (ii) provision of plant and costs in connection therewith;
  - (iii) the supply, transportation, handling and storage of materials and goods;
  - (iv) sampling and testing and costs in connection therewith;
  - (v) assembling, fixing, erecting, installing or placing of materials and goods in position;
  - (vi) wastage, bulking, shrinkage and the disposal of surplus material;
  - (vii) Temporary Works;
  - (viii) taking precautions and measures as far as is reasonable and practical to prevent interference with or damage to existing structures and utilities, roads, footpaths and paved areas, watercourses and drainage systems, public and private vehicular and pedestrian accesses, trees, graves and burial urns, including the provision of alternative access, if necessary;
  - (ix) keeping the Works where necessary, and as near as may be practical, free of water and protected from damage due to water and from weather conditions which may adversely affect the Works, and taking measures to prevent flotation of new or existing structures;
  - (x) provision of working space and upholding the sides of excavations;
  - (xi) submitting to the Engineer all drawings, details of procedures and methods of construction to be used, technical literature, test certificates and any other documents or information required to be submitted under the Contract;
  - (xii) in the case of materials supplied by the Employer, return of the surplus;

- (xiii) in the case of plant and equipment supplied by the Employer, protection, maintenance and repair of such plant and equipment while it is on the Site, costs in connection with operating such plant and equipment, and return of plant and equipment to the Employer or replacement of such plant and equipment if it is damaged beyond repair or lost;
- (xiv) notifying, making arrangements and liaising with all relevant Government Departments, authorities or other interested parties to obtain all licences and permits necessary for the execution of the Works, and costs in connection therewith;
- (xv) liabilities, obligations and risks involved in the execution of the Works set forth or reasonably implied in the Contract;
- (xvi) establishment charges, overheads and profit.

- Measurement** 3. The measurement of work shall be computed net from the Drawings unless stated otherwise in the Method of Measurement.
- Item coverage** 4. If any item coverage includes reference to work which is the subject of item coverages elsewhere in the Method of Measurement, then the combined item coverages shall apply.
- Use of alternative materials or designs** 5. Where in the Contract a choice of alternative materials or designs is indicated for a given purpose, the description billed and rates inserted shall be deemed to cover any of the permitted alternative materials or designs which the Contractor may elect to use.
- Unpriced items** 6. Items against which no rate is entered shall be deemed to be covered by the other rates in the Bills of Quantities.
- General Attendance** 7. General Attendance in connection with Nominated Sub-contractors shall include for affording the use of existing work space, access, temporary roads, erected scaffolding, working shelters, staging, ladders, hoists, storage, latrines, messing, welfare and other facilities existing on Site and the provision of protection, water, telephone, electricity for lighting, and clearing away rubbish and debris arising from the work.
- Special Attendance** 8. Special Attendance required for the Nominated Sub-contractor shall be any facility not covered under paragraph 7 above and shall be clearly described in the Contract.
- Work affected by non-tidal open water or tidal water** 9. The Contractor shall allow in the rates for taking all measures required to execute the work described as being affected by non-tidal open water or tidal water and measured separately.
- For the measurement of such work, the extent of the work described in the Contract as being affected by non-tidal open water or tidal water shall be used irrespective of the actual extent of the works so affected.
- Adjustment Item** 10. A tenderer may insert a lump sum addition or deduction which shall not exceed 10% of the total of the Bills of Quantities before the addition or deduction of that lump sum against the Adjustment Item given in the Grand Summary. For the purposes of Clause 79 of the General Conditions of

Contract for Civil Engineering Works (1990 Edition), additions or deductions on account of the amount, if any, of the Adjustment Item shall be made by instalments in interim certificates in the proportion that the amount referred to

in Clause 79(1) (a), (b), (c), (d) and (e) of the General Conditions of Contract for Civil Engineering Works (1990 Edition) bears to the total of the Bills of Quantities excluding the Contingency Sum and the Adjustment Item. Such interim additions or deductions shall be made before deduction of the Retention Money and shall not exceed in the aggregate the amount of the Adjustment Item. Any balance of the Adjustment Item outstanding after interim additions or deductions shall be added to or deducted from the final payment.

For the avoidance of doubt, the Effective Value referred to in Clause 89 of the General Conditions of Contract for Civil Engineering Works (1990 Edition) shall include all sums payable in respect of the Adjustment Item.

***Cost of test of materials and workmanship***

11. Unless otherwise specifically provided for as separate items in the Bills of Quantities, the rates contained in the Contract shall be deemed to include for the cost of carrying out all tests on materials and workmanship specified in the Contract, including but not limited to, the cost of packing and transport required for delivering samples to and collecting from the place of testing.

**PARTICULAR PREAMBLES**

***Amendments to the Method of Measurement***

1. For the purpose of this Contract, the Method of Measurement is amended in accordance with the following particular preambles.



**PART V**

**UNITS AND METHOD OF MEASUREMENT**



**SECTION 1**

**PRELIMINARIES**

- Note* 1.01 Items whose units of measurement are time based shall not be measured :
- (i) between the end of the time for completion or extended time for completion of the Works and the date of completion of the Works as described in the Contract;
  - (ii) after the expiration of the Maintenance Period where services are required as a consequence of the default of the Contractor.

**TEMPORARY ACCOMMODATION FOR THE ENGINEER**

- Units* 1.02 The units of measurement shall be :
- (i) erection of temporary accommodation for the Engineer, dismantling of temporary accommodation for the Engineer, handing over temporary accommodation to the Employer .....item.
  - (ii) servicing of temporary accommodation for the Engineer .....month.

*Measurement* 1.03 The measurement for the servicing of temporary accommodation for the Engineer shall commence from the date when the accommodation, equipment and services are provided for occupation and use.

*Itemisation* 1.04 Separate items shall be provided for temporary accommodation for the Engineer in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Erection. 2. Servicing. 3. Dismantling. 4. Handing over to the Employer.
II	1. Principal offices for the Engineer 2. Secondary offices for the Engineer. 3. Principal laboratory for the Engineer. 4. Secondary laboratory for the Engineer.

*Erection of temporary* 1.05 ~~The items for the erection of temporary accommodation for the Engineer shall, in accordance with General Preambles paragraph 2, include for :~~

***accommodation  
for the Engineer***

***Item coverage***

- (a) provision of areas within the Site;
- (b) excavation, levelling and preparation;
- (c) foundations, bases and hardstandings;
- (d) water, sanitation, heating, air conditioning, power, lighting, telephone and communication services;
- (e) fences, notices and direction boards;
- (f) vehicle access, parking areas and footways;
- (g) office and laboratory supplies, furniture and equipment, and surveying instruments.

***Servicing of  
temporary  
accommodation  
for the Engineer***

1.06 The items for the servicing temporary accommodation for the Engineer shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) charges for water, heating, power, lighting and telephone;
- (b) maintenance of buildings, services, fences, notice and direction boards, vehicle access, parking areas, hardstandings and footways;
- (c) maintenance of office and laboratory furniture and equipment and surveying instruments, and equivalent replacement of furniture, equipment and surveying instruments when the original furniture, equipment and instruments are unserviceable;
- (d) cleaning;
- (e) moving and re-establishing accommodation;
- (f) operatives, field assistants and office attendants;
- (g) replenishment of consumables.

***Dismantling of  
temporary  
accommodation  
for the Engineer***

1.07 The items for dismantling of temporary accommodation for the Engineer shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) receiving back supplies, furniture, equipment and surveying instruments not required by the Employer;
- (b) disconnecting and removing utilities, and sealing disused utilities;
- (c) demolishing, dismantling and removing off Site temporary accommodation, vehicle access, hardstandings, parking areas, footways, fences, notice and direction boards;
- (d) reinstatement of the areas occupied by temporary accommodation, vehicle accesses, hardstandings, parking areas, footways, fences, notices and direction boards.

***Handing over  
temporary  
accommodation***

1.08 The items for handing over temporary accommodation to the Employer shall, in accordance with General Preambles paragraph 2, include for :



*to the Employer*

- Item coverage**
- (a) receiving back supplies, furniture, equipment and surveying instruments not required by the Employer;
  - (b) refurbishing, replacing, repairing and repainting.

**TEMPORARY ACCOMMODATION FOR THE CONTRACTOR**

- Units**                    1.09    The unit of measurement shall be :
- (i) temporary accommodation for the Contractor..... item.

- Itemisation**            1.10    Separate items shall be provided for temporary accommodation for the Contractor in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Temporary accommodation for the Contractor.

---

- Temporary accommodation for the Contractor**            1.11    The items for temporary accommodation for the Contractor shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) erection, servicing and removal of everything required by the Contractor, including sheds, stores, workman's accommodation and the like;
  - (b) reinstatement of the sites occupied by temporary accommodation.

**MAINTENANCE OF TRAFFIC FLOW**

- Units**                    1.12    The unit of measurement shall be :
- (i) provision of measures, maintenance of measures, removal of measures .....item.

- Itemisation**            1.13    Separate items shall be provided for maintenance of traffic flow in accordance with General Principles paragraphs 3 and 4 and the following:

Group	Feature
-------	---------

- 
- |   |   |
|---|---|
| I | <ol style="list-style-type: none"> <li>1. Provision of measures.</li> <li>2. Maintenance of measures.</li> <li>3. Removal of measures.</li> </ol> |
|---|---|
- 

- |    |  |
|----|--|
| II | <ol style="list-style-type: none"> <li>1. To maintain land traffic flow.</li> <li>2. To maintain marine traffic flow.</li> </ol> |
|----|--|
- 

***Provision of measures to maintain traffic flow***

1.14 The items for provision of measures to maintain traffic flow shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) permits and licences;
- (b) preparing, amending as necessary, and submitting to the Engineer and other interested bodies for approval, details of and drawings showing proposals and programme, including necessary liaison;
- (c) preparation of site, excavation or dredging in any material and disposal of surplus material;
- (d) temporary carriageways, ramps, decking, structures, footways, kerbs, parapets, fencing and barriers;
- (e) temporary street lighting;
- (f) temporary traffic signs and signals;
- (g) temporary road markings and the removal or masking of permanent road markings;
- (h) temporary diversions of utilities;
- (i) complying with the traffic safety codes;
- (j) phasing of those works affected by compliance with approved traffic measures;
- (k) temporary buoys, navigation lights, markers and the like.

***Maintenance of measures to maintain traffic flow***

1.15 The items for maintenance of measures to maintain traffic flow shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) operatives;
- (b) power supply;
- (c) repairing or replacing equipment which is dirty or not in working order;
- (d) cleaning traffic lights, lights and signs.

***Removal of measures to maintain traffic flow***

1.16 The items for removal of measures to maintain traffic flow shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) breaking up and clearing away temporary carriageways, ramps, structures, footways, kerbs, parapets, fencing, barriers, utilities, lighting, traffic signs, signals, buoys, markers and the like;
- (b) reinstatement of the site to its original condition.

## SECURITIES, SURETIES AND INSURANCES

- Units** 1.17 The unit of measurement shall be :
- (i) securities or sureties, insurance of the Works, third party insurance ..... item.

- Itemisation** 1.18 Separate items shall be provided for securities, sureties and insurances in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Securities or sureties. 2. Insurance of the Works. 3. Third party insurance.

---

## TRANSPORT FOR THE USE OF THE ENGINEER

- Units** 1.19 The units of measurement shall be :
- (i) land transport for the use of the Engineer, marine transport for the use of the Engineer .....number.
- (ii) operation and maintenance of land transport for the use of the Engineer, operation and maintenance of marine transport for the use of the Engineer .....week.

- Measurement** 1.20 The measurement of operation and maintenance of land or marine transport for the use of the Engineer shall be the period between the date of delivery of the land or marine transport to the Engineer and the date instructed by the Engineer for its removal.

- Itemisation** 1.21 Separate items shall be provided for transport for the use of the Engineer in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Land transport for the use of the Engineer.</li> <li>2. Operation and maintenance of land transport for the use of the Engineer.</li> <li>3. Marine transport for the use of the Engineer.</li> <li>4. Operation and maintenance of marine transport for the use of the Engineer.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types of land transport.</li> <li>2. Different types of marine transport.</li> </ol>

<b><i>Land transport for the use of the Engineer</i></b>	1.22	The items for land transport for the use of the Engineer shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ol style="list-style-type: none"> <li>(a) delivery of an approved vehicle in proper working order;</li> <li>(b) collection of the vehicle when no longer required;</li> <li>(c) credit value of vehicle when returned.</li> </ol>
<b><i>Operation and maintenance of land transport for the use of the Engineer</i></b>	1.23	The items for operation and maintenance of land transport for the use of the Engineer shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ol style="list-style-type: none"> <li>(a) tax, insurances, parking, ferry and tunnel charges;</li> <li>(b) driver;</li> <li>(c) an adequate replacement vehicle when the regular vehicle is unavailable or unserviceable;</li> <li>(d) maintenance and cleaning;</li> <li>(e) fuel, oil and other consumables.</li> </ol>
<b><i>Marine transport for the use of the Engineer</i></b>	1.24	The items for marine transport for the use of the Engineer shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ol style="list-style-type: none"> <li>(a) delivery of an approved vessel in proper working order;</li> <li>(b) collection of the vessel when no longer required;</li> <li>(c) credit value of the vessel when returned.</li> </ol>
<b><i>Operation and maintenance of marine transport for the use of the Engineer</i></b>	1.25	The items for operation and maintenance of marine transport for the use of the Engineer shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ol style="list-style-type: none"> <li>(a) licence, insurance and mooring fees;</li> </ol>

- (b) coxswain and crew;
- (c) an adequate replacement vessel when the regular vessel is unavailable or unserviceable;
- (d) maintenance and cleaning;
- (e) fuel, oil and other consumables.

**DATA PROCESSING EQUIPMENT FOR THE ENGINEER**

*Units* 1.26 The unit of measurement shall be :

- (i) data processing equipment for the Engineer .....item.

*Itemisation* 1.27 Separate items shall be provided for data processing equipment for the Engineer in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Data processing equipment for the Engineer.
II	1. Installed in the Engineer's Site office. 2. Installed in the Engineer's head office. 3. Installed in locations detailed in the Specification.
III	1. To be handed over to the Employer on completion.

*Data processing equipment for the Engineer* 1.28 The items for data processing equipment for the Engineer shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage*
- (a) installation of all items, including connecting devices, connection to power supply and installation of software;
  - (b) taking any measures necessary to render the power supply uniform, stable and adequate for the equipment;
  - (c) diagnostic and performance checking;
  - (d) provision of vendor's maintenance support service;
  - (e) cleaning, resetting and preventive maintenance service;
  - (f) attendance on maintenance technicians;
  - (g) replacement parts;
  - (h) where the equipment is to be handed over to the Employer, documentation of assignment of ownership and maintenance agreements;
  - (i) where the equipment is not to be handed over to the Employer, disconnection, repacking and removal and the credit value.

**PHOTOGRAPHS**

**Units** 1.29 The unit of measurement shall be :

(i) set of progress photographs, record photographs .....number.

**Measurement** 1.30 The measurement of a set of progress photographs shall be the number of sets selected by the Engineer. A set shall be the negative together with the respective prints of the size and number described in the Contract.

**Itemisation** 1.31 Separate items shall be provided for photographs in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Set of progress photographs. 2. Record photographs.
II	1. Underwater.

**Photographs** 1.32 The items for photographs shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) album for mounting photographs;
  - (b) storage album for negatives;
  - (c) delivery of negatives and prints to the Engineer;
  - (d) identification marking on the prints;
  - (e) frames, mounts and titles;
  - (f) use of divers.

**HOARDINGS, TEMPORARY FENCES AND SIGNBOARDS**

**Units** 1.33 The units of measurement shall be :

(i) hoardings, temporary fences .....linear metre.  
(ii) signboards .....number.

**Measurement** 1.34 The measurement of hoardings and temporary fences shall be the length along their centrelines, inclusive of gates and entrances.

1.35 Hoardings and temporary fences shall only be measured where shown on the Drawings.

**Itemisation** 1.36 Separate items shall be provided for hoardings, temporary fences and signboards in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Hoardings. 2. Temporary fences. 3. Signboards.
II	1. Different types.
III	1. Different sizes.
IV	1. To be handed over to the Employer on completion.

***Hoardings,  
temporary  
fences and  
signboards***

1.37 The items for hoardings, temporary fences and signboards shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) excavation in any material;
- (b) backfilling and compaction;
- (c) disposal of surplus excavated material;
- (d) concrete, reinforcement, formwork and granular material to foundations and anchorages, forming holes, pockets, sockets, mortices and the like;
- (e) entrances, gates and the like;
- (f) painting and lettering;
- (g) maintaining;
- (h) demolition and removal;
- (i) reinstatement of the areas occupied;
- (j) where hoardings, temporary fences and signboards are to be handed over to the Employer, refurbishing, replacing, repairing and repainting.





## SECTION 2

### GROUND INVESTIGATION

#### RIGS

- Units** 2.01 The units of measurement shall be :
- (i) establishment of rigs .....item.
  - (ii) moving rigs .....number.
  - (iii) standing time for rigs .....hour.
- Measurement** 2.02 The measurement for establishment of rigs shall be for bringing the equipment to the Site.
- 2.03 The measurement for moving rigs shall correspond to the number of boreholes, drillholes and probeholes shown on the Drawings or ordered by the Engineer.
- 2.04 The measurement of standing time for rigs shall be the hours for each rig standing idle during normal working hours, as defined in Section 27, from the time the Contractor notifies the Engineer that he is awaiting instructions and gives details of the circumstances until the time such instructions are issued.
- 2.05 In the case of marine work, the time taken to move the marine plant to the nearest typhoon shelter when the tropical cyclone warning signal No. 3 or higher is hoisted and the time taken to return to Site will be measured as standing time for rigs.
- Itemisation** 2.06 Separate items shall be provided for rigs in accordance with General Principles paragraphs 3 and 4 and the following :
- 
- | Group | Feature  |
|-------|--|
| I     | 1. Establishment of rigs.<br>2. Moving rigs.<br>3. Standing time for rigs. |
- 
- Establishment of rigs** 2.07 The items for establishment of rigs shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) providing sufficient numbers of rigs, together with all ancillary equipment;
  - (b) removing the rigs and ancillary equipment off Site;
  - (c) providing, transporting and setting up pontoons, barges and the like,

and their subsequent removal.

**Moving rigs** 2.08 The items for moving rigs shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) provision, maintenance and removal of all Temporary Works required as access and working platforms;
- (b) site clearance and reinstatement;
- (c) diversion of watercourses;
- (d) setting up rigs;
- (e) transferring and positioning pontoons, barges and the like.

**Standing time for rigs** 2.09 The items for standing time for rigs shall, in accordance with the General Preambles paragraph 2, include for :

**Item coverage**

- (a) all drilling equipment, boring equipment, probing equipment, ancillary equipment, testing equipment, Temporary Works and barges;
- (b) rig personnel and crew.

## **DRILLING, BORING AND PROBING**

**Units** 2.10 The unit of measurement shall be :

- (i) drilling, boring, probing .....linear metre.

**Measurement** 2.11 The measurement of drilling, boring and probing shall be the drilled or bored length of the hole.

**Itemisation** 2.12 Separate items shall be provided for drilling, boring and probing in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
I	<ul style="list-style-type: none"> <li>1. Drilling.</li> <li>2. Boring.</li> <li>3. Probing.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Vertically downwards.</li> <li>2. Downwards at an angle 0°- 45° to the vertical.</li> <li>3. Horizontally or downwards at an angle less than 45° to the horizontal.</li> <li>4. Upwards at an angle 0°- 45° to the horizontal.</li> <li>5. Upwards at an angle less than 45° to the vertical.</li> </ul>

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Group	Feature
III	<ol style="list-style-type: none"> <li>1. Different sizes of core.</li> <li>2. Different sizes of hole.</li> </ol>
IV	<ol style="list-style-type: none"> <li>1. Material other than rock or artificial hard material.</li> <li>2. Rock.</li> <li>3. Artificial hard material.</li> </ol>

<b><i>Drilling, boring and probing</i></b>	2.13	The items for drilling, boring and probing shall, in accordance with General Preambles paragraph 2, include for:
<b><i>Item coverage</i></b>		<ol style="list-style-type: none"> <li>(a) water, compressed air or other drilling fluid;</li> <li>(b) casing to hole;</li> <li>(c) backfilling the hole, reinstating and marking position;</li> <li>(d) taking readings, measurements and observations, and recording and supplying the logs of each drillhole, borehole or probehole to the Engineer.</li> </ol>

### **TRIAL PITS AND INSPECTION PITS**

<b><i>Units</i></b>	2.14	The unit of measurement shall be : <ol style="list-style-type: none"> <li>(i) trial pit, inspection pit, extra over for excavation in rock, extra over for excavation in artificial hard material ..... cubic metre.</li> </ol>
<b><i>Measurement</i></b>	2.15	The total volume of any one trial pit or inspection pit shall be assigned to the item with a depth range within which its maximum depth falls. Measurement shall only be made for trial pits and inspection pits excavated on the specific instruction of the Engineer, and not for pits excavated in meeting the Contractor's obligations to establish the locations of existing utilities and underground features.
<b><i>Itemisation</i></b>	2.16	Separate items shall be provided for trial pits and inspection pits in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Trial pits.</li> <li>2. Inspection pits.</li> <li>3. Extra over for excavation in rock.</li> <li>4. Extra over for excavation in artificial hard material.</li> </ol>

Group	Feature
II	<ol style="list-style-type: none"> <li>1. Maximum depth not exceeding 3.00 m.</li> <li>2. Maximum depth exceeding 3.00 m but not exceeding 6.00 m and so on in steps of 3.00 m.</li> </ol>

***Trial pits and inspection pits***

2.17 The items for trial pits and inspection pits shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) access;
- (b) excavation in any material;
- (c) saw-cutting and cutting through reinforcement;
- (d) disposal of surplus excavated material;
- (e) temporary fencing;
- (f) backfilling, compaction and reinstatement;
- (g) taking readings, measurements and observations, and recording and supplying the log of each trial pit to the Engineer;
- (h) in the case of trial pits, taking photographs and submitting to the Engineer.

## **SAMPLES AND ROCK CORES**

***Units***

2.18 The units of measurement shall be :

- (i) samples .....number.
- (ii) rock cores .....linear metre.

***Measurement***

2.19 The measurement of samples shall be the number of samples ordered by the Engineer and of length or size not less than specified.

2.20 The measurement of rock cores shall be the length of the specified core recovered and measured in the core box.

***Itemisation***

2.21 Separate items shall be provided for samples and rock cores in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Different types of samples.</li> <li>2. Different sizes of cores.</li> </ol>

***Samples and rock cores***

2.22 The items for samples and rock cores shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) containers for samples and core boxes;
- (b) labelling, photographing and packing samples and cores;
- (c) transporting samples and cores to the Engineer's store and/or

approved testing laboratory.

**IN-SITU TESTS**

- Units* 2.23 The unit of measurement shall be :
  - (i) in-situ tests .....number.
- Measurement* 2.24 The measurement of in-situ tests shall be the number of in-situ tests carried out as ordered by the Engineer.
- Itemisation* 2.25 Separate items shall be provided for in-situ tests in accordance with General Principles paragraphs 3 and 4 and the following :
 

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Group	Feature
I	1. Different types of test.

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- In-situ tests* 2.26 The items for in-situ tests shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage*
  - (a) testing equipment, moving between holes and removing on completion;
  - (b) taking readings, measurements and observations, and recording and supplying records of the tests to the Engineer.

**INSTRUMENT INSTALLATION**

- Units* 2.27 The unit of measurement shall be :
  - (i) instrument installation .....number.
- Measurement* 2.28 The measurement of instrument installation shall be the number of instrument installations installed in completed holes, as ordered by the Engineer.
- Itemisation* 2.29 Separate items shall be provided for instrument installation in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature

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I 1. Different types of instrument installation.

<b><i>Instrument</i></b>	2.30	The items for instrument installation shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) excavation in any material, including backfilling, compaction, disposal of surplus excavated material and reinstatement;</li> <li>(b) temporary fencing and protection;</li> <li>(c) lockable surface box;</li> <li>(d) installation records and submitting to the Engineer;</li> <li>(e) calibration and maintenance of instruments;</li> <li>(f) reference and identification markers, and marker buoys;</li> <li>(g) taking measures to ensure that instruments suffer the least amount of disturbance;</li> <li>(h) taking readings, measurements and observations, and recording and supplying records to the Engineer;</li> <li>(i) credit value of that part of the installation which becomes the property of the Contractor.</li> </ul>

**LABORATORY TESTS**

<b><i>Units</i></b>	2.31	<p>The units of measurement shall be :</p> <ul style="list-style-type: none"> <li>(i) laboratory tests .....number.</li> <li>(ii) extra over testing time .....hour.</li> </ul>
<b><i>Measurement</i></b>	2.32	The measurement of laboratory tests shall be the number of tests ordered by the Engineer.
	2.33	<p>The measurement of extra over testing time shall be the testing time exceeding :</p> <ul style="list-style-type: none"> <li>(i) 60 hours for a single-stage triaxial compression test on soil;</li> <li>(ii) 144 hours for three stage (multi-stage) test on the same specimen.</li> </ul> <p>The commencement time for a single-stage or multi-stage test shall be the time at which consolidation is commenced.</p>
<b><i>Itemisation</i></b>	2.34	Separate items shall be provided for laboratory tests in accordance with General Principles paragraphs 3 and 4 and the following:

---

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Different types of laboratory tests.</li> <li>2. Extra over testing time.</li> </ul>

---

**Laboratory tests** 2.35 The items for laboratory tests shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) attendance and supervision of testing at approved laboratories;
  - (b) calibration of instruments;
  - (c) selecting, extruding and preparing specimens from the supplied samples, as directed by the Engineer;
  - (d) taking readings, measurements and observations, and recording and supplying the record of each test to the Engineer;
  - (e) photographs;
  - (f) retaining samples until directed by the Engineer.

## REPORT WORK

**Units** 2.36 The unit of measurement shall be :

- (i) draft final report, final report .....item.

**Itemisation** 2.37 Separate items shall be provided for report work in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Draft final report.</li> <li>2. Final report.</li> </ul>

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**Report work** 2.38 The items for report work shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) report boxes and folders





## SECTION 3

### SITE CLEARANCE

- Note** 3.01 The taking up of existing carriageways, pavings and kerbs, other than those required to be set aside for re-laying or removing to store, and the demolition of underground structures or foundations (including in the case of demolition of buildings or structures, work below and including ground slabs), shall be measured in the Earthworks Section.

### SITE CLEARANCE

- Units** 3.02 The units of measurement shall be :
- (i) general site clearance .....square metre, hectare.
  - (ii) demolition of individual or groups of buildings or structures .....item.
  - (iii) removal of disused sewers, drains or ducts .....linear metre.

- Measurement** 3.03 The measurement of general site clearance shall be the plan area of the Site.
- 3.04 The removal of disused sewers, drains or ducts below existing ground surface shall be measured only where the disused sewers, drains or ducts will not be removed as part of the excavation measured under the Earthworks Section.

- Itemisation** 3.05 Separate items shall be provided for site clearance in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	<ol style="list-style-type: none"> <li>1. General site clearance.</li> <li>2. General site clearance of areas separately indicated on the Drawings.</li> <li>3. Demolition of individual or groups of buildings or structures.</li> <li>4. Removal of disused sewers, drains or ducts of different diameters.</li> </ol>

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- General site clearance** 3.06 The items for general site clearance shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage** (a) demolition, breaking up and removal of signs, lamp standards,

- fences, walls and disused ducts, pipes, sewers or drains above ground level and superficial obstructions affected by the Works;
- (b) felling of trees, grubbing up stumps and roots, filling stump and root holes with fine fill material and compacting;
- (c) removal of branches from trees which are not to be felled and treating cut surfaces with wound sealant;
- (d) uprooting of bushes and hedges;
- (e) credit value of material which becomes the property of the Contractor;
- (f) disposal of surplus material;
- (g) disconnecting and sealing utilities, and recording the position of sealed utilities;
- (h) making good severed ends of existing fences, walls, utilities and other items, including fixing posts at ends of strained fences and restraining fences;
- (i) making good damage to buildings and other surfaces caused by the removal of signs, fences, lamp standards and the like.

***Demolition of individual or groups of buildings or structures***

3.07 The items for the demolition of individual or groups of buildings or structures down to ground level shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) carrying out surveys of buildings or structures prior to demolition;
- (b) demolition of the buildings or structures down to ground level, but excluding the removal of any ground slab;
- (c) disconnecting and sealing utilities, and marking and recording the position of sealed utilities, including liaising with relevant authorities;
- (d) credit value of material which becomes the property of the Contractor;
- (e) disposal of surplus material;
- (f) protecting areas adjacent to demolition works from damage resulting from such demolition;
- (g) making good damage to buildings, structures and pavements caused by the removal of adjoining buildings or structures.

***Removal of disused sewers, drains or ducts***

3.08 The items for the removal of disused sewers, drains or ducts shall, in accordance with the General Preambles paragraph 2, include for :

***Item coverage***

- (a) excavation in any material;
- (b) removal of associated manholes, catchpits, gullies, drawpits and the like;
- (c) preliminary site trials of blasting;
- (d) loosening or breaking up by blasting or other means sewer, drain or duct of whatever type of construction, together with any bed, haunch or surround;
- (e) cutting through reinforcement;
  
- (f) trimming the bottom and sides of excavation and clearing away loose rock;

- (g) backfilling with suitable material from any source and compaction;
- (h) disposal of surplus material;
- (i) sealing the ends of sewers or drains.

**TAKE UP AND STORE; TAKE UP AND DELIVER;  
TAKE UP, STORE AND RE-ERECT; TAKE UP, STORE  
AND REINSTATE**

**Units**

3.09 The units of measurement shall be :

- (i) paved areas and the like .....square metre.
- (ii) fencing, pipes, cables and the like .....linear metre.
- (iii) lamp standards, traffic signs, valves, fittings and the  
like .....number.

**Itemisation**

3.10 Separate items shall be provided for take up and store, take up and deliver, take up, store and re-erect and take up, store and reinstate in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Take up and store.</li> <li>2. Take up and deliver.</li> <li>3. Take up, store and re-erect.</li> <li>4. Take up, store and reinstate.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Deliver to different locations.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different types of paved areas.</li> <li>2. Different types of fencing.</li> <li>3. Different types and diameters of pipes.</li> <li>4. Different types of lamp standards.</li> <li>5. Different types of other stated materials, street furniture or fittings.</li> </ol>

***Take up and store; take up and deliver; take up, store and re-erect; take up, store and reinstate***

3.11 The items for take up and store, take up and deliver, take up, store and re-erect and take up, store and reinstate shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) excavation in any material and reinstating;
- (b) cleaning and breaking off any foundations, bedding or the like;
- (c) making good any damage and replacing losses and breakages;
- (d) disposal of surplus material;
- (e) disconnecting and sealing utilities, and recording the position of sealed utilities;
- (f) making good damage to buildings and other surfaces caused by the removal of signs, fences, lamp standards and the like;
- (g) re-erection or reinstatement, including construction of foundations or base;
- (h) granular material to footings;
- (i) finishing, curing and protecting;
- (j) replacing any item damaged during the foregoing operations.

## SECTION 4

### FENCING

#### FENCES, HANDRAILS, RAILINGS, GUARD-RAILINGS, PARAPETS AND GATES

- Units** 4.01 The units of measurement shall be :
- (i) fences, handrails, railings, guard-railings, parapets .....linear metre.
  - (ii) gates .....number.
- Measurement** 4.02 The measurement of fences, handrails, railings, guard-railings and parapets shall be the length along their centreline.
- 4.03 Fences, handrails, railings, guard-railings and parapets which are curved on plan between posts or supports shall be defined as curved. Fences, handrails, railings, guard-railings and parapets which are set out to a curve but are straight between posts or supports shall not be defined as curved.
- Itemisation** 4.04 Separate items shall be provided for fences, handrails, railings, guard-railings, parapets and gates in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Fences.</li> <li>2. Handrails.</li> <li>3. Railings.</li> <li>4. Guard-railings.</li> <li>5. Parapets.</li> <li>6. Gates.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> <li>2. Different materials.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Different heights of fences, railings, guard-railings and parapets.</li> <li>2. Different heights and widths of gates.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Curved.</li> </ul>

Group	Feature
V	1. Different protective treatments and painting.
VI	1. With mesh infill.

***Fences,  
handrails,  
railing, guard-  
railings, parapets***

4.05 The items for fences, handrails, railings, guard-railings and parapets shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) excavation in any material;
- (b) backfilling and compaction;
- (c) disposal of surplus excavated material;
- (d) driving posts and struts in any material;
- (e) concrete, reinforcement, formwork and granular material to foundations and anchorages, forming holes, pockets, sockets, mortices and the like;
- (f) jointing to existing fences, handrails, railings, guard-railings and the like;
- (g) provision and maintenance of accesses for owners, tenants and occupiers of adjoining lands;
- (h) baseplates, sockets, ends, ramps, angles, joint fittings, holding down bolts, washers, nuts, fastenings and the like;
- (i) casting in bolts, sockets, baseplates and application of bonding agents, fillers and sealing materials;
- (j) straining line wires, chain link fencing and barbed wire and securing;
- (k) protective treatment and painting;
- (l) trimming or filling ground to maintain uniform clearance between bottom of fence and ground.

***Gates***

4.06 The items for gates shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) excavation in any material;
- (b) backfilling and compaction;
- (c) disposal of surplus excavated material;
- (d) concrete, reinforcement, formwork and granular material to foundations, forming holes, sockets, mortices and the like;
- (e) posts, hinges, fastenings, stops, locks and keys;
- (f) forming openings in existing fences or walls and making good;
- (g) trimming ground at entrances;
- (h) baseplates, sockets, ends, ramps, angles, joint fittings, holding down bolts, nuts, fastenings and the like;
- (i) casting in bolts, sockets, baseplates and application of bonding agents, fillers and sealing materials;
- (j) protective treatment and painting;
- (k) trimming or filling ground to maintain uniform clearance between bottom of gate and ground.

**UNTENSIONED BEAM BARRIERS**

- Units**
- 4.07 The units of measurement shall be :
- (i) untensioned beam barriers .....linear metre.
  - (ii) anchor blocks, end beams, end specials, transition pieces .....number.

- Measurement**
- 4.08 The measurement of untensioned beam barriers shall be the length along the centreline of the barrier between the connections to the anchor block, end beams, end specials or transition pieces.
- 4.09 The measurement of anchor blocks, end beams, end specials and transition pieces or connections shall be of the complete installation.
- 4.10 Untensioned beam barriers which are curved on plan between posts shall be defined as curved. Untensioned beam barriers which are set out to a curve but are straight between posts shall not be defined as curved.

- Itemisation**
- 4.11 Separate items shall be provided for untensioned beam barriers in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Untensioned beam barriers.</li> <li>2. Anchor blocks.</li> <li>3. End beams.</li> <li>4. End specials.</li> <li>5. Transition pieces.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Curved.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Different protective treatments and painting.</li> </ul>

- Untensioned beam barriers, anchor blocks, end beams, etc**
- 4.12 The items for untensioned beam barriers, anchor blocks, ends beams, end specials and transition pieces shall, in accordance with General Preambles Paragraph 2, include for:

- Item coverage**
- (a) excavation in any material;
  - (b) backfilling and compaction;
  - (c) disposal of surplus excavated material;
  - (d) driving posts in any material;
  - (e) concrete, reinforcement, formwork to foundations and anchorages, finishes to concrete, forming holes, pockets, sockets, mortices and the like;

- (f) jointing to existing fences;
- (g) baseplates, sockets, ends, ramps, angles, joint fittings, holding down bolts, washers, nuts, fastenings and the like;
- (h) casting in bolts, sockets and baseplates, and application of bonding agents, fillers and sealing materials;
- (i) protective treatment and painting;
- (j) trimming or filling ground to maintain uniform clearance between bottom of barrier and ground.



## SECTION 5

### DRAINAGE AND DUCTS

*Note* 5.01 Headwall and outfall works shall be measured in accordance with the units of measurement, measurements and itemisation set out in the relevant Sections for Earthworks, Formwork, Steel Reinforcement, Concrete and the like.

### SEWERS, DRAINS, PIPED CULVERTS, DUCTS AND TRENCH DRAINS

*Units* 5.02 The units of measurement shall be :

- (i) sewers, drains, piped culverts, ducts, trench drains .....linear metre.
- (ii) connections to existing sewers, drains, ducts, trench drains, culverts, watercourses, manholes, other chambers and drawpits .....number.

*Measurement* 5.03 The measurement of sewers, drains, piped culverts, ducts and trench drains shall be the summed lengths of the categories described within each depth range. Length shall be measured along the centreline between the following terminations:

- (i) the external face of manhole or other chamber, gully or headwall;
- (ii) the intersection of the centreline of the pipes at pipe junctions;
- (iii) the position of the termination shown on the Drawings;
- (iv) the point at which the depth range changes.

5.04 Depths of sewers, drains, piped culverts and ducts in trenches and trench drains shall be the vertical measurement between the invert of the pipe or duct and the following :

- (i) where the invert level is below the existing ground surface - the existing ground surface, except that where the earthworks final surface is below the existing ground surface the measurement shall be taken to the earthworks final surface;
- (ii) where the invert is at or above the existing ground surface - the earthworks final surface;
- (iii) where a length of pipeline in or beneath areas of fill is not permitted to be constructed until a specified minimum level of cover is obtained then notwithstanding paragraphs 5.04(i) and (ii) above - to the specified minimum level of cover or the earthworks final surface whichever is the lower.

**Itemisation**

5.05 Separate items shall be provided for sewers, drains, piped culverts, ducts and trench drains in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Sewers, drains or piped culverts.</li> <li>2. Ducts, different numbers of ways.</li> <li>3. Trench drains.</li> <li>4. Connections to existing sewers, drains, ducts, trench drains, culverts, watercourses, manholes, other chambers and drawpits.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types or materials.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different diameters.</li> </ol>
IV	<ol style="list-style-type: none"> <li>1. Different types of bed, surround, haunch or filling.</li> </ol>
V	<ol style="list-style-type: none"> <li>1. In trench, depth not exceeding 1.50 m.</li> <li>2. In trench, depth exceeding 1.50 m but not exceeding 2.50 m and so on in steps of 1.00 m.</li> <li>3. In headings.</li> <li>4. By jacking or thrust boring.</li> <li>5. Suspended on different types of supports.</li> </ol>

***Sewers, drains,  
piped culverts,  
etc.***

5.06 The items for sewers, drains, piped culverts, ducts and trench drains shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) ascertaining nature, location and size of existing utilities prior to commencement of excavation;
- (b) inspecting pipes, joints and fittings immediately before and immediately after installation and repairing damage;
- (c) excavation in any material except rock and artificial hard material;
- (d) access shafts to headings and their subsequent reinstatement;
- (e) thrust pits and thrust blocks for pipe jacking, including additional excavation and removal and reinstatement;
- (f) completion of formation;
- (g) cutting, laying, jointing and bedding pipes and fittings;
- (h) mastic filler and anticorrosion tape;
- (i) fixings, hangers, stools and other supports;
- (j) laying and compacting pipe bedding, haunching and surround material;
- (k) polyethylene sheeting or blinding layer;

- (l) formwork;
- (m) reinforcement;
- (n) membranes;
- (o) filter material and compaction;
- (p) backfilling with special fill material and compaction;
- (q) reinstatement of topsoil and turf;
- (r) disposal of surplus excavated material;
- (s) cleaning and checking bore, linearity and joints;
- (t) recording, staking and labelling of junctions and terminations;
- (u) draw wires, plugs, marker blocks and identification tapes;
- (v) movement joints to concrete beds, haunches and surrounds and compressible padding between pipes and supports;
- (w) in the case of pipes not being jointed, sealing the ends of pipes.

***Connections to existing sewers, drains, etc.***

5.07 The items for connections to existing sewers, drains, ducts, trench drains, culverts, watercourses, manholes, other chambers and drawpits shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) locating existing sewers, drains, ducts or trench drains;
- (b) excavation in any material;
- (c) breaking into existing sewers, drains, ducts or trench drains, dealing with the existing flow and making the connections, including necessary fittings, saddles and the like;
- (d) breaking into existing culverts, watercourses, manholes, other chambers, concrete benching, channels and drawpits, dealing with the existing flow, making the connections, and making good the benching, channels and walls;
- (e) backfilling with special fill material and compaction;
- (f) disposal of surplus excavated material.

## **PENSTOCKS AND VALVES**

***Units***

5.08 The unit of measurement shall be :

- (i) extra over for penstocks, gate valves, flap valves, sludge valves, air valves and other stated types of valves .....number.

***Itemisation***

5.09 Separate items shall be provided for penstocks and valves in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Extra over for penstocks.</li> <li>2. Extra over for gate valves.</li> <li>3. Extra over for flap valves.</li> <li>4. Extra over for sludge valves.</li> <li>5. Extra over for air valves.</li> <li>6. Extra over for other stated types of valves.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different diameters.</li> </ol>

***Extra over for penstocks and valves***

5.10 The items for extra over for penstocks, gate valves, flap valves, sludge valves, air valves and other stated types of valves shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) cutting, preparation, fabrication and assembly;
- (b) internal and external protection;
- (c) stripping and making good internal and external protection to pipes;
- (d) painting;
- (e) mastic filler and anticorrosion tape;
- (f) additional joints to pipes;
- (g) cleaning and greasing moving parts.

**MANHOLES, GULLIES, CATCHPITS, OTHER CHAMBERS AND DRAWPITS**

***Units***

5.11 The unit of measurement shall be :

- (i) manholes, gullies, catchpits, other chambers, drawpits .....number.

***Measurement***

5.12 The measurement shall be of the complete manhole, gully, catchpit, other chamber and drawpit.

5.13 Depths of manholes shall be the distance between the top surface of the cover and the invert of the main channel. Depths of catchpits, drawpits and other chambers shall be the distance between the top surface of the cover or grating and the uppermost surface of the base slab.

**Itemisation**

- 5.14 Separate items shall be provided for manholes, gullies, catchpits, other chambers and drawpits in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Manholes.</li> <li>2. Gullies.</li> <li>3. Catchpits.</li> <li>4. Other chambers.</li> <li>5. Drawpits.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different types of covers, gratings and overflow weirs.</li> </ol>
IV	<ol style="list-style-type: none"> <li>1. Depth not exceeding 1.50 m.</li> <li>2. Depth exceeding 1.50 m but not exceeding 2.50 m and so on in steps of 1.00 m.</li> </ol>

**Manholes,  
catchpits, gullies,  
etc.**

- 5.15 The items for manholes, catchpits, gullies, other chambers and drawpits shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) ascertaining nature, location and size of existing utilities prior to commencement of excavation;
- (b) excavation in any material except rock and artificial hard material;
- (c) forming channels and benchings, and building in pipe connections, including fittings and pipes;
- (d) backdrops;
- (e) footholes, step irons, access ladders and safety chains;
- (f) covers, frames, gratings, overflow weirs and lifting keys;
- (g) surround;
- (h) polyethylene sheeting or blinding layer;
- (i) formwork and moulds;
- (j) reinforcement and steel sections;
- (k) backfilling with fine fill material and compaction;
- (l) in the case of manholes and chambers in carriageways, backfilling excavation with Grade 10 concrete;
- (m) disposal of surplus excavated material;
- (n) completion of formation.

## DRAINAGE CHANNELS

- Units** 5.16 The unit of measurement shall be :
- (i) drainage channels .....linear metre.
- Measurement** 5.17 The measurement shall be the length of the drainage channel along its centreline.
- Itemisation** 5.18 Separate items shall be provided for drainage channels in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Half round channels. 2. U channels. 3. Stepped channels. 4. Trapezoidal channels. 5. Other types of channels.
II	1. Different sizes.
III	1. Different types of cover.

---

- Drainage channels** 5.19 The items for drainage channels shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) excavation in any material except rock and artificial hard material;
  - (b) trimming of side slopes and inverts;
  - (c) connection to existing drainage channels;
  - (d) backfilling excavation with Grade 10 concrete;
  - (e) disposal of surplus excavated material;
  - (f) dealing with the flow of water;
  - (g) levelling and compacting of bedding material and filter material;
  - (h) building in pipes;
  - (i) reinforcement;
  - (j) formwork;
  - (k) falls, cambers and shaped profiles;
  - (l) steps, junctions and connections;
  - (m) construction and movement joints;
  - (n) waterbars or waterstops;
  - (o) concrete apron.

## EXCAVATION IN ROCK AND ARTIFICIAL HARD MATERIAL

- Units** 5.20 The unit of measurement shall be :
- (i) extra over for excavation in rock, extra over for excavation in artificial hard material .....cubic metre.
- Measurement** 5.21 The measurement shall be the volume of the voids formed by the removal of the rock and artificial hard material within the widths, lengths and depths required in the Contract for sewers, drains, piped culverts, ducts, trench drains, headings, manholes, gullies, catchpits, other chambers, drawpits, drainage channels and the like.
- Itemisation** 5.22 Separate items shall be provided for excavation in rock and artificial hard material in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | 1. Extra over for excavation in rock, blasting permitted.<br>2. Extra over for excavation in rock, blasting not permitted.<br>3. Extra over for excavation in artificial hard material, blasting permitted.<br>4. Extra over for excavation in artificial hard material, blasting not permitted. |
- Extra over for excavation in rock and artificial hard material etc.** 5.23 The items for extra over for excavation in rock and artificial hard material shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) saw-cutting and cutting through reinforcement;  
 (b) trimming;  
 (c) making good overbreak;  
 (d) in the case of blasting being permitted, blasting trials, measurement and recording of vibrations and supplying copy of records to the Engineer, checking and adjusting accuracy of seismographs, preparatory work for blasting, notifying the Engineer when explosives are to be brought onto Site, screens and other protective covers, drilling shot holes, charging, stemming and blasting.

## SOFT SPOTS AND OTHER VOIDS

- Units** 5.24 The unit of measurement shall be :
- (i) excavation of soft spots, filling of soft spots and other voids .....cubic metre.
- Measurement** 5.25 The measurement of soft spots and other voids shall be the volume of the soft spot or void ordered by the Engineer to be excavated and/or filled.
- Itemisation** 5.26 Separate items shall be provided for soft spots and other voids in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature   |
|-------|---|
| I     | 1. Excavation of soft spots.<br>2. Filling of soft spots and other voids.   |
| II    | 1. General fill material.<br>2. Fine fill material.<br>3. Granular fill material.<br>4. Special fill material.<br>5. Grade 10 concrete.<br>6. Other stated fill material. |
- Excavation of soft spots** 5.27 The items for excavation of soft spots shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) disposal of excavated material.
- Filling of soft spots and other voids etc.** 5.28 The items for filling of soft spots and other voids shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) material from any source and compaction;  
(b) formwork.

## SUPPORTS LEFT IN EXCAVATION

- Units** 5.29 The unit of measurement shall be :
- (i) supports left in excavation .....square metre.
- Measurement** 5.30 The measurement shall be the area of face ordered by the Engineer to be left with supports in position.
- Itemisation** 5.31 Separate items shall be provided for supports left in excavation in accordance with General Principles paragraphs 3 and 4 and the following :



Group	Feature
I	1. Different types of supports.
II	1. Left in pit or trench. 2. Left in heading.

**Supports left in excavation**

5.32 The items for supports left in excavation shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) working around supports during backfilling.

**REINSTATEMENT OF EXISTING CARRIAGEWAYS, FOOTWAYS AND PAVED AREAS**

**Units**

5.33 The unit of measurement shall be :

- (i) extra over for reinstatement of existing carriageways, extra over for reinstatement of existing footways, extra over for reinstatement of other stated existing paved areas .....square metre.

**Measurement**

5.34 The measurement shall be the area reinstated within the limits of excavation as required by the Contract.

**Itemisation**

5.35 Separate items shall be provided for reinstatement of existing carriageways, footways and paved areas in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Extra over for reinstatement of existing carriageways. 2. Extra over for reinstatement of existing footways. 3. Extra over for reinstatement of other stated existing paved areas.
II	1. Different types of construction.

**Extra over for reinstatement of existing**

5.36 The items for extra over for reinstatement of existing carriageways, footways and paved areas shall, in accordance with General Preambles paragraph 2, include for:

*carriageways, etc.*

***Item coverage***

- (a) grading, mixing, depositing, spreading, laying and compacting all materials, tack coats, forming and sealing of joints, formwork, reinforcement, curing and protecting;
- (b) cutting of blocks around manholes and the like;
- (c) making good overbreak, including matching with existing and cutting back to expose reinforcement for bonding;
- (d) bedding, jointing, cutting and replacing blocks, kerbs, edgings, channels, barriers and fences;
- (e) forming surfaces to match existing finishes, levels and falls;
- (f) replacing street furniture, road studs and road markings;
- (g) completion of formation;
- (h) saw-cutting and cutting through reinforcement

### **ADJUSTMENT OF LEVEL OF COVERS TO EXISTING MANHOLES AND OTHER CHAMBERS**

***Units***

5.37 The unit of measurement shall be :

- (i) raise existing cover, lower existing cover .....number.

***Itemisation***

5.38 Separate items shall be provided for adjustment of level of covers to existing manholes and other chambers in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Raise level of cover.</li> <li>2. Lower level of cover.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types of manholes or other chamber.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Not exceeding 250 mm.</li> <li>2. Exceeding 250 mm but not exceeding 500 mm and so on in steps of 250 mm.</li> </ul>

***Adjustment of level of covers to existing manholes etc.***

5.39 The items for the adjustment of the level of covers to existing manholes and other chambers shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) taking up and storing covers and frames;
- (b) excavation in any material, breaking out, the provision of materials and construction of the manhole or other chamber to new level, including extending or cutting steel bar reinforcement, step irons and ladders;
- (c) taking covers and frames from store, and reinstallation;
- (d) backfilling and compaction;
- (e) disposal of surplus excavated material;
- (f) making good surrounding surfaces;
- (g) maintaining existing flow.

## **DRAINAGE AND DUCTS IN STRUCTURES**

***Units***

5.40 The unit of measurement shall be :

- (i) drainage in structures, ducts in structures .....item.

***Itemisation***

5.41 Separate items shall be provided for drainage and ducts in structures in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Drainage. 2. Ducts.
II	1. Different structures or parts of structures.

***Drainage and ducts in structures***

5.42 The items for drainage and ducts in structures shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) building into, fixing to or forming in the structure manholes, gullies, other chambers, drawpits, junction boxes and the like, including formwork, reinforcement and covers;
- (b) building into or fixing to the structure pipework, gutters, ducts and the like, including fittings, brackets and hangers, and removing protective coating from pipes to be built in;
- (c) additional flexible joints in pipes adjacent to outside face of structure;
- (d) draw wires in ducts;
- (e) casting in fixtures for lighting and telephone facilities;
- (f) making good protective treatments;
- (g) temporary sealing to ends of pipes built into structures and subsequent removal.

## DRAINAGE LAYERS

- Units** 5.43 The unit of measurement shall be :
- (i) drainage layers .....cubic metre.
- Itemisation** 5.44 Separate items shall be provided for drainage layers in accordance with General Principles paragraphs 3 and 4 and the following :
- 
- | Group | Feature                                |
|-------|--|
| I     | 1. Different types of drainage layers. |
- 
- Drainage layers** 5.45 The items for drainage layers shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) compaction and bringing up in advance of the backfill;  
 (b) formwork.

## GRANULAR FILTERS

- Units** 5.46 The unit of measurement shall be :
- (i) granular filters .....cubic metre.
- Itemisation** 5.47 Separate items shall be provided for granular filters in accordance with General Principles paragraphs 3 and 4 and the following :
- 
- | Group | Feature                                 |
|-------|---|
| I     | 1. Different types of granular filters. |
- 
- Granular filters** 5.48 The items for granular filters shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) compaction and bringing up in advance of the backfill.

## GEOTEXTILE FILTER

- Units** 5.49 The unit of measurement shall be :
- (i) geotextile filter .....square metre.
- Measurement** 5.50 The measurement shall be the area of the surface to which the geotextile filter is

applied.

- Itemisation** 5.51 Separate items shall be provided for geotextile filter in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Different types of geotextile filter.

---

- Geotextile filter** 5.52 The items for geotextile filter shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) preparation of the surface to receive the geotextile filter;
  - (b) cutting, lapping and jointing;
  - (c) recording and supplying records to the Engineer.

## **FILLING AND SEALING DISUSED MANHOLES AND OTHER CHAMBERS**

- Units** 5.53 The unit of measurement shall be :

- (i) filling and sealing disused manholes, filling and sealing other stated chambers .....number.

- Measurement** 5.54 The measurement shall be the number of disused manholes and other chambers filled and sealed.

- Itemisation** 5.55 Separate items shall be provided for the filling and sealing of disused manholes and other chambers in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Filling and sealing disused manholes. 2. Filling and sealing other stated chambers.
II	1. Different stated dimensions.
III	1. Different types of filling material.

---

- Filling and sealing of disused manholes, etc.** 5.56 The items for filling and sealing of disused manholes and other chambers shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) excavation in any material, partial demolition and disposal of all surplus material off site;
  - (b) cleaning out and keeping free of water;
  - (c) removing covers and frames;
  - (d) sealing ends of pipes connecting to manhole or chamber;
  - (e) backfilling with material from any source and compaction.

## FILLING AND SEALING DISUSED PIPES

- Units** 5.57 The unit of measurement shall be :
- (i) filling and sealing disused pipes .....linear metre.
- Measurement** 5.58 The measurement of filling and sealing disused pipes shall be the summed length of the categories described. Length shall be measured along the centreline between the following terminations :
- (i) the internal face of manhole or other chamber, gully or headwall;
  - (ii) the intersection of the centrelines of the pipes at pipe junctions;
  - (iii) the position of the terminations shown on the Drawings.

- Itemisation** 5.59 Separate items shall be provided for filling and sealing disused pipes in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Filling and sealing disused pipes.
II	1. Different diameters.
III	1. Different types of fill material.

- Filling and sealing disused pipes** 5.60 The items for filling and sealing disused pipes shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) locating disused pipes;
  - (b) excavation in any material;
  - (c) cleaning out and keeping free from water;
  - (d) sealing ends of pipes;
  - (e) backfilling with material from any source and compaction;
  - (f) disposal of surplus excavated material.

## CLOSED CIRCUIT TELEVISION INSPECTION OF PIPELINES

- Units** 5.61 The units of measurement shall be :

- (i) establishment of inspection equipment .....item.
- (ii) closed circuit television inspection of pipelines .....linear metre.

**Itemisation**

5.62 Separate items shall be provided for closed circuit television inspection of pipelines in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Establishment of inspection equipment.</li> <li>2. Closed circuit television inspection of pipelines.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different diameters.</li> </ul>

**Establishment of inspection equipment**

5.63 The items for establishment of inspection equipment shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) bringing inspection, recording and control equipment to the Site, assembling and setting up, maintaining, moving as necessary and subsequently removing equipment.

**Closed circuit television inspection of pipelines**

5.64 The items for closed circuit television inspection of pipelines shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) removing and replacing covers of existing manholes and other chambers;
- (b) dealing with flow in existing pipelines;
- (c) taking readings, measurements, observations, photographs and recordings of inspections, and supplying records, recordings, photographs and report of defects found to the Engineer;
- (d) films, video tape and album for photographs;
- (e) carrying out inspection from both directions in a pipe, where necessary.





## SECTION 6

### PIPEWORK

- Notes**
- 6.01 This section shall be used to measure pipework designed for use under pressure.
- 6.02 Headwall and outfall works, valve chambers, pier supports, thrust blocks and the like shall be measured in accordance with the units of measurement, measurements and itemisation set out in the relevant Sections for Drainage and Ducts, Earthworks, Formwork, Steel Reinforcement, Concrete and the like.

### PIPES

- Units**
- 6.03 The unit of measurement shall be :
- (i) pipes .....linear metre.
- Measurement**
- 6.04 The measurement of pipes shall be the summed lengths of the categories described within each depth range. Length shall be measured along the centreline through pipe fittings, valves and joints, with tapers included under the diameter of the larger pipe, between the following terminations :
- (i) the external face of manhole or other chamber or headwall;
- (ii) the intersection of the centreline of the pipes at pipe junctions;
- (iii) the position of the termination indicated on the Drawings;
- (iv) the point at which the depth range changes;
- (v) for pipes within chambers, the external faces of the chambers.
- 6.05 For pipes in trenches, depths shall be the vertical measurement between the invert level of the pipe and the following :
- (i) where the invert level is below the existing ground surface - the existing ground surface, except that where the earthworks final surface is below the existing ground surface the measurement shall be taken to the earthworks final surface;
- (ii) where the invert is at or above the existing ground surface - the earthworks final surface;
- (iii) where a length of pipeline in or beneath areas of fill is not permitted to be constructed until a specified minimum level of cover is obtained, then notwithstanding paragraphs 6.05(i) and (ii) above - to the specified minimum level of cover or the earthworks final surface, whichever is the lower.
- Itemisation**
- 6.06 Separate items shall be provided for pipes in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Different types of pipe.
II	1. Different diameters.
III	1. Different types of bed, surround, haunch or filling.
IV	<ol style="list-style-type: none"> <li>1. In trench, depth not exceeding 1.50 m.</li> <li>2. In trench, depth exceeding 1.50 m but not exceeding 2.50 m and so on in steps of 1.00 m.</li> <li>3. In headings.</li> <li>4. By jacking or thrust boring.</li> <li>5. Suspended on different types of supports.</li> </ol>
V.	1. Pipes and joints supplied by the Employer.

**Pipes**

6.07 The items for pipes shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) ascertaining nature, location and size of existing utilities prior to commencement of excavation;
  - (b) excavation in any material except rock and artificial hard material;
  - (c) access shafts to headings and their subsequent reinstatement;
  - (d) thrust pits and thrust blocks for pipe jacking, including additional excavation and removal and reinstatement;
  - (e) taking delivery of materials supplied by the Employer and transporting to Site and/or point of use;
  - (f) laying and bedding pipes;
  - (g) anticorrosion tape;
  - (h) inspecting pipes and joints immediately before and immediately after pipelaying and repairing damage;
  - (i) fixings, hangers and the like;
  - (j) laying and compacting pipe bedding, haunching and surround materials;
  - (k) polyethylene sheeting or blinding layer;
  - (l) movement joints to concrete beds, haunches and surrounds and compressible padding between pipes and supports;
  - (m) formwork;
  - (n) reinforcement;
  - (o) backfilling with special fill material and compaction;
  - (p) reinstatement of topsoil and turf;
  - (q) disposal of surplus excavated material;
- (r) recording, staking and labelling of junctions and terminations,

- (s) chainages and levels;
- (s) internal and external protection, including repairing internal and external protection at joints and damaged areas;
- (t) painting;
- (u) temporary stoppers to ends of pipes already laid;
- (v) cleansing and sterilisation, including taking delivery of water and chemicals supplied by the Employer, transporting to Site and/or point of use and draining on completion;
- (w) competency tests for welders;
- (x) stripping external protection where mild steel pipes are encased in concrete.

**VALVES AND PIPE FITTINGS**

**Units**

- 6.08 The unit of measurement shall be :
- (i) extra over for valves, bends, junctions, tees, tapers, special fittings and other stated fittings .....number.

**Measurement**

- 6.09 Gussetted bends in steel pipes shall be measured as follows :

- Less than 6° - included in measurement for pipe.
- Over 6° up to 30° - measured as 30° bend.
- Over 30° up to 45° - measured as 45° bend.
- Over 45° up to 60° - measured as 60° bend.
- Over 60° up to 90° - measured as 90° bend.

**Itemisation**

- 6.10 Separate items shall be provided for valves and pipe fittings in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Extra over for valves.</li> <li>2. Extra over for bends.</li> <li>3. Extra over for junctions.</li> <li>4. Extra over for tees.</li> <li>5. Extra over for tapers.</li> <li>6. Extra over for special fittings.</li> <li>7. Extra over for other stated fittings.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Different diameters.</li> </ul>

Group Feature

- 
- 
- IV. 1. Valves, fittings, joints and materials supplied by the Employer.
- 

***Extra over for valves and stated fittings***

- 6.11 The items for extra over for valves, junctions, tees, tapers, special fittings and other stated fittings shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) taking delivery of materials supplied by the Employer and transporting to Site and/or point of use;
- (b) cutting, preparation, fabrication and assembly, including extension keys and clamps for valves;
- (c) inspecting valves and fittings immediately before and immediately after installation and repairing damage;
- (d) internal and external protection;
- (e) stripping and making good internal and external protection;
- (f) painting.

**JOINTS TO NEW PIPES, VALVES AND FITTINGS AND CONNECTIONS TO EXISTING PIPES, VALVES AND EQUIPMENT**

***Units***

- 6.12 The unit of measurement shall be :

- (i) joints and connections .....number.

***Measurement***

- 6.13 The measurement of joints shall be the number of complete joints installed in the pipeline as shown on the Drawings or instructed by the Engineer.

***Itemisation***

- 6.14 Separate items shall be provided for joints and connections in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
-------	---------

---

- |   |  |
|---|--|
| I | <ul style="list-style-type: none"> <li>1. Joints.</li> <li>2. Connections to existing pipes, valves or equipment.</li> </ul> |
|---|--|
- 

- |    |   |
|----|---|
| II | <ul style="list-style-type: none"> <li>1. Different types.</li> </ul> |
|----|---|
- 

Group	Feature
-------	---------

---

III 1. Different diameters.

---

IV. 1. Joints and accessories supplied by the Employer.

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***Joints and connections***

6.15 The items for joints and connections shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) taking delivery of materials supplied by the Employer and transporting to Site and/or point of use;
- (b) preparation, fabrication and assembly;
- (c) stripping and making good internal and external protection;
- (d) cleaning insides of pipes, fittings and valves;
- (e) providing ventilation, equipment and facilities for inspecting inside pipes;
- (f) internal and external protection;
- (g) painting;
- (h) locating existing pipes;
- (i) dealing with the existing flow;
- (j) in the case of connections to existing pipes, trials to prove connections.

**CUTTING PIPES**

***Units***

6.16 The unit of measurement shall be :

- (i) cutting pipes .....number.

***Measurement***

6.17 Cutting pipes for fabricating fittings shall not be measured.

***Itemisation***

6.18 Separate items shall be provided for cutting pipes in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
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I 1. Cutting pipes.

---

II 1. Different materials.

---

III 1. Different diameters.

---

***Cutting pipes***

6.19 The items for cutting pipes shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) stripping and making good internal and external protection;

- (b) measuring, marking and cutting pipes straight or to any angle;
- (c) preparing cut ends of pipes for welding or jointing.

## **EXCAVATION IN ROCK AND ARTIFICIAL HARD MATERIAL**

- Units**                    6.20    The unit of measurement shall be :
- (i)    extra over for excavation in rock, extra over for excavation in artificial hard material .....cubic metre.
- Measurement**            6.21    The measurement shall be the volume of the voids formed by the removal of the rock and artificial hard material within the widths, lengths and depths required in the Contract for pipework.
- Itemisation**            6.22    Separate items shall be provided for excavation in rock and artificial hard material in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | <ul style="list-style-type: none"> <li>1. Extra over for excavation in rock, blasting permitted.</li> <li>2. Extra over for excavation in rock, blasting not permitted.</li> <li>3. Extra over for excavation in artificial hard material, blasting permitted.</li> <li>4. Extra over for excavation in artificial hard material, blasting not permitted.</li> </ul> |
- Extra over for excavation in rock, etc.**            6.23    The items for extra over for excavation in rock and artificial hard material shall, in accordance with General Preambles paragraph 2, include for :
- (a)    saw-cutting and cutting through reinforcement;
  - (b)    trimming;
  - (c)    making good overbreak;
  - (d)    in the case of blasting being permitted, blasting trials, measurement and recording of vibrations and supplying copy of records to the Engineer, checking and adjusting accuracy of seismographs, preparatory work for blasting, notifying the Engineer when explosives are to be brought onto Site, screens and other protective covers, drilling shot holes, charging, stemming and blasting.
- Item coverage**

## SOFT SPOTS AND OTHER VOIDS

- Units** 6.24 The unit of measurement shall be :
- (i) excavation of soft spots, filling of soft spots and other voids .....cubic metre.
- Measurement** 6.25 The measurement of soft spots and other voids shall be the volume of the soft spot or void ordered by the Engineer to be excavated and/or filled.
- Itemisation** 6.26 Separate items shall be provided for soft spots and other voids in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Excavation of soft spots. 2. Filling of soft spots and other voids.
II	1. General fill material. 2. Fine fill material. 3. Granular fill material. 4. Special fill material. 5. Grade 10 concrete. 6. Other stated fill material.

- Excavation of soft spots** 6.27 The items for excavation of soft spots shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) disposal of excavated material.
- Filling of soft spots and other voids** 6.28 The items for filling of soft spots and other voids shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) material from any source and compaction;  
(b) formwork.

## SUPPORTS LEFT IN EXCAVATION

- Units** 6.29 The unit of measurement shall be :
- (i) supports left in excavation .....square metre.
- Measurement** 6.30 Measurement shall be the area of face ordered by the Engineer to be left with supports in position.
- Itemisation** 6.31 Separate items shall be provided for supports left in excavation in accordance

with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Different types of supports.
II	1. Left in pit or trench. 2. Left in heading.

<b><i>Supports left in excavation</i></b>	6.32	The items for supports left in excavation shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		(a) working around supports during backfilling.

### **REINSTATEMENT OF EXISTING CARRIAGEWAYS, FOOTWAYS AND PAVED AREAS**

<b><i>Units</i></b>	6.33	The unit of measurement shall be :  (i) extra over for reinstatement of existing carriageways, extra over for reinstatement of existing footways, extra over for reinstatement of other stated existing paved areas .....square metre.
<b><i>Measurement</i></b>	6.34	The measurement shall be the area reinstated within the limits of excavation as required by the Contract.
<b><i>Itemisation</i></b>	6.35	Separate items shall be provided for reinstatement of existing carriageways, footways and paved areas in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Extra over for reinstatement of existing carriageways. 2. Extra over for reinstatement of existing footways. 3. Extra over for reinstatement of other stated existing paved areas.
II	1. Different types of construction.

<b><i>Extra over for reinstatement of</i></b>	6.36	The items for extra over for reinstatement of existing carriageways, footways and paved areas shall, in accordance with General Preambles paragraph 2,
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*existing  
carriageways, etc.*

include for:

***Item coverage***

- (a) grading, mixing, depositing, spreading, laying and compacting all materials, tack coats, forming and sealing joints, formwork, reinforcement, curing and protecting;
- (b) cutting of blocks around manholes and the like;
- (c) making good overbreak, including matching with existing and cutting back to expose reinforcement for bonding;
- (d) bedding, jointing, cutting and replacing blocks, kerbs, edgings, channels, barriers and fences;
- (e) forming surfaces to match existing finishes, levels and falls;
- (f) replacing street furniture, road studs and road markings;
- (g) saw-cutting and cutting through reinforcement.



## SECTION 7

### EARTHWORKS

- Notes**
- 7.01 For the purpose of this Section, it shall be assumed that one cubic metre of material to be excavated forms one cubic metre of compacted fill material, and no allowance shall be made in the measurement for bulking and shrinkage.
- 7.02 No account shall be taken of excavated material arising from the Works measured in accordance with Sections 1 to 6, and 8 and 9, of the Method of Measurement.
- 7.03 Any additional fill material, deposition and compaction required due to settlement of an area of fill shall be measured only when this occurs after completion of the deposition and compaction of fill material to the lines and levels in the manner described by the Contract.

### EXCAVATION

- Units**
- 7.04 The unit of measurement shall be :
- (i) excavation .....cubic metre.
- Measurement**
- 7.05 The measurement of general excavation shall be the volume of the void formed by the excavation to the lines and levels shown on the Drawings or described in the Contract.
- 7.06 The measurement of excavation for structures and foundations shall be the volume which is to be occupied by the structure or foundation, plus any additional volume vertically above any part of the structure or foundation measured up to existing ground surface or earthworks final surface, whichever is the lower. In the case of structures or foundations constructed in fill material, no measurement will be made.
- 7.07 The total volume of excavation for any one structure or foundation shall be assigned to the item with a depth range within which its maximum depth falls.
- Itemisation**
- 7.08 Separate items shall be provided for excavation in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. General excavation.</li> <li>2. Excavation for structures.</li> <li>3. Excavation for foundations.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Material other than rock or artificial hard material.</li> <li>2. Rock, blasting permitted.</li> <li>3. Rock, blasting not permitted.</li> <li>4. Artificial hard material, blasting permitted.</li> <li>5. Artificial hard material, blasting not permitted.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Structure maximum depth not exceeding 3.00 m.</li> <li>2. Structure maximum depth exceeding 3.00 m but not exceeding 6.00 m and so on in steps of 3.00 m.</li> <li>3. Foundation maximum depth not exceeding 3.00 m.</li> <li>4. Foundation maximum depth exceeding 3.00 m but not exceeding 6.00 m and so on in steps of 3.00 m.</li> </ol>

***Excavation of material, etc.***

7.09 The items for excavation of material other than rock or artificial hard material shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) loosening or breaking up material before or in the process of excavation;
- (b) multiple handling of excavated material;
- (c) loading into transport;
- (d) the use of material for the protection of the sub-grade and its subsequent removal;
- (e) forming and trimming side slopes, benching and berms, or in the case of structures or foundations, trimming the bottom and sides of excavation;
- (f) excavating around and between piles;
- (g) additional excavation the Contractor may require for working space, timbering, formwork or other temporary works and its subsequent backfilling, compaction and reinstatement;
- (h) dealing with water in watercourses;
- (i) carrying out excavation by hand adjacent to utilities that are known, proven or suspected to exist;
- (j) carrying out excavations next to structures by hand;
- (k) excavating and replacing material not stated in the Contract to be excavated but which has been allowed to deteriorate;
- (l) completion of earthworks final surfaces.

***Excavation in rock, etc.***

7.10 The items for excavation in rock and artificial hard material shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) loosening or breaking up by blasting or other means, material before or in the process of excavation;

- (b) saw cutting and cutting through reinforcement;
- (c) multiple handling of excavated material;
- (d) loading into transport;
- (e) the use of material for the protection of the sub-grade and its subsequent removal;
- (f) overbreak and making good;
- (g) forming and trimming side slopes, benching and berms, or in the case of structures or foundations, trimming the bottom and sides of excavation and clearing away loose rock;
- (h) excavating around and between piles;
- (i) additional excavation the Contractor may require for working space, timbering, formwork or other temporary works and its subsequent backfilling, compaction and reinstatement;
- (j) dealing with water in watercourses;
- (k) excavating and replacing material not stated in the Contract to be excavated but which has been allowed to deteriorate;
- (l) completion of earthworks final surfaces;
- (m) in the case of blasting being permitted, blasting trials, measurement and recording of vibrations and supplying copy of the records to the Engineer, checking and adjusting accuracy of seismographs, preparatory work for blasting, notifying the Engineer when explosives are to be brought onto Site, screens and other protective covers, drilling shot holes, charging, stemming and blasting.

**DEPOSITION OF FILL MATERIAL**

*Units* 7.11 The unit of measurement shall be :

- (i) deposition of fill material .....cubic metre.

*Measurement* 7.12 The measurement of deposition of fill material shall be the volume of compacted fill material calculated in accordance with paragraphs 7.26 to 7.28 inclusive, less the volume of imported fill material calculated in accordance with paragraph 7.21.

7.13 Deposition of rock fill material shall only be separately measured where rock fill material is specifically shown on the Drawings.

*Itemisation* 7.14 Separate items shall be provided for deposition of fill material in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Deposition.

---

Group Feature

- 
- |    |  |
|----|--|
| II | <ol style="list-style-type: none"> <li>1. General fill material.</li> <li>2. Fine fill material.</li> <li>3. Granular fill material.</li> <li>4. Special fill material.</li> <li>5. Rock fill material.</li> <li>6. Other stated type of fill material.</li> </ol> |
|----|--|
- 

- |     |   |
|-----|---|
| III | <ol style="list-style-type: none"> <li>1. In embankments.</li> <li>2. In platforms.</li> <li>3. In slopes.</li> <li>4. In intermediate areas of fill.</li> <li>5. Above foundations.</li> <li>6. Adjacent to structures.</li> <li>7. Other stated locations.</li> </ol> |
|-----|---|
- 

***Deposition of fill material***

7.15 The items for deposition of fill material shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) selecting materials;
- (b) haulage;
- (c) making good or replacing material which is allowed to become unsuitable for use in the permanent works;
- (d) breaking down material necessary to comply with the requirements of fill;
- (e) processing and mixing materials to make them suitable for use as fill material;
- (f) replacing excavated material required for use in the permanent works as fill material which has been removed from Site or used for other purposes;
- (g) mechanical or chemical treatment of materials;
- (h) adjustment and control of moisture content;
- (i) layering or deposition in locations indicated;
- (j) multiple handling of materials;
- (k) complying with the requirements for the equalisation of earth pressure or the sequence or rate of deposition;
- (l) excavation, deposition and compaction of benches;
- (m) depositing filling material to slope away from vertical drainage layers and providing temporary drainage to prevent surface water from entering such drainage layers;
- (n) overfilling of areas of fill and subsequent cutting back;
- (o) trimming and shaping to required levels and contours;
- (p) the use of material for the protection of the sub-grade and its subsequent removal;
- (q) preparation of surface;
- (r) imported fill material and/or deposition of fill material lost by settlement of or penetration into the underlying material;
- (s) in the case of rock fill material, blinding the final surface with fine fill material;
- (t) completion of earthworks final surfaces.

## DISPOSAL OF MATERIAL

- Units** 7.16 The unit of measurement shall be :
- (i) disposal of material .....cubic metre.
- Measurement** 7.17 The measurement of the disposal of material shall be the volume of material excavated from within the Site (including rock and artificial hard material) measured in this Section, less the volume of compacted fill material calculated in accordance with paragraphs 7.26 to 7.28 inclusive (after deduction of the volume of imported fill material calculated in accordance with paragraph 7.21), less the volume of material calculated in accordance with paragraph 17.08.
- Itemisation** 7.18 Separate items shall be provided for disposal of material in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | 1. Disposal of material.   |
| II    | 1. In tips provided by the Contractor.<br>2. In tips provided by the Employer. |
- Disposal of material** 7.19 The items for disposal of material shall in accordance with General Preambles paragraph 2 include for :
- Item coverage**
- (a) haulage and deposition in tips off Site;  
 (b) multiple handling of material;  
 (c) allowing for deposition in lieu of disposal as replacement of the loss of fill material resulting from settlement of, or penetration into, the underlying material;  
 (d) credit value of material which becomes the property of the Contractor.

## IMPORTED FILL MATERIAL

- Units** 7.20 The unit of measurement shall be :
- (i) imported fill material .....cubic metre.
- Measurement** 7.21 The measurement of each type of imported fill material shall be the volume of each type of compacted fill material calculated in accordance with paragraphs 7.26 to 7.28 inclusive, less the volume of each type of fill material excavated from within the Site measured in this Section.

7.22 Imported rock fill material shall only be separately measured where rock fill material is specifically shown on the Drawings.

**Itemisation**

7.23 Separate items shall be provided for imported fill material in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Imported general fill material.</li> <li>2. Imported fine fill material.</li> <li>3. Imported granular fill material.</li> <li>4. Imported special fill material.</li> <li>5. Imported rock fill material.</li> <li>6. Other stated types of imported fill material.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. In embankments.</li> <li>2. In platforms.</li> <li>3. In slopes.</li> <li>4. In intermediate areas of fill.</li> <li>5. Above foundations.</li> <li>6. Adjacent to structures.</li> <li>7. Other stated locations.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Provided by the Contractor.</li> <li>2. Provided and delivered by others.</li> <li>3. Provided by others, collected by the Contractor from stated location.</li> </ol>

**Imported fill material**

7.24 The items for imported fill material shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) haulage;
- (b) layering or depositing in locations indicated on the Drawings;
- (c) complying with requirements for the equalisation of earth pressure or the sequence or rate of deposition;
- (d) adjustment and control of moisture content;
- (e) excavation, deposition and compaction in benches;
- (f) depositing fill material to slope away from any vertical drainage layer and providing temporary drainage to prevent surface water from entering such drainage layer;
- (g) overfilling of areas of fill and subsequent removal;
- (h) trimming and shaping to required levels and contours;
- (i) the use of material for the protection of the sub-grade and its subsequent removal;
- (j) imported fill material to replace fill material lost by settlement of or penetration into the underlying material;
- (k) making good or replacing material which is allowed to become unsuitable for use in the permanent works;
- (l) taking delivery of fill material;



- (m) completion of earthworks final surfaces.

**COMPACTION OF FILL MATERIAL**

**Units**

7.25 The unit of measurement shall be :

- (i) compaction of fill material .....cubic metre.

**Measurement**

7.26 ~~The measurement of compaction of fill material in embankments, platforms, slopes and intermediate areas of fill shall be the volume formed or void filled up to earthworks final surface from existing ground surface together with the filling of any void the excavation of which has been measured in accordance with paragraph 7.05 of this Section.~~

7.27 The measurement of compaction of fill material above foundations shall be the volume of the void excavated measured in accordance with paragraph 7.06 less the volume of the foundation and structure within that void.

7.28 The measurement of compaction of fill material adjacent to structures shall be the volume filled to the lines and levels as shown on the Drawings, or if no such indication is made on the Drawings, within 3.00 metres of any structure, but not below any structure and excluding that defined as being above foundations. It shall also exclude that required for backfilling necessitated by excavation for working space and overbreak.

7.29 Compaction of rock fill material shall only be separately measured where rock fill material is specifically shown on the Drawings.

**Itemisation**

7.30 Separate items shall be provided for compaction in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Compaction.

---

Group	Feature
II	1. General fill material. 2. Fine fill material.

---

3. Granular fill material.
4. Special fill material.
5. Rock fill material.
6. Other stated types of fill material.

- 
- III
1. In embankments.
  2. In platforms.
  3. In slopes.
  4. In intermediate areas of fill.
  5. Above foundations.
  6. Adjacent to structures.
  7. Other stated locations.
- 

***Compaction of  
fill material***

7.31 The items for compaction of fill material shall, in accordance with General Preambles paragraph 2, include for:

***Item coverage***

- (a) spreading and levelling;
- (b) blinding;
- (c) adjustment and control of moisture content;
- (d) forming and trimming of side slopes, benchings and berms;
- (e) complying with requirements for the equalisation of earth pressure;
- (f) providing and maintaining telltales for the measurement of settlement;
- (g) any trials by the Contractor to demonstrate compaction methods different from those stated in the Contract. Fill materials compacted by such trials and accepted as part of the Works will be included in the measurement of the Works;
- (h) compaction of overfilling of areas of fill;
- (i) compaction of additional fill material to replace fill material lost by settlement of, or penetration into, the underlying material;
- (j) protection of formations;
- (k) completion of earthworks final surfaces.

## **PRESPLITTING AND SMOOTH BLASTING**

***Units***

7.32 The unit of measurement shall be :

- (i) presplitting, smooth blasting .....square metre.

***Measurement***

7.33 Presplitting and smooth blasting shall only be measured where specified. The measurement of presplitting and smooth blasting shall be the surface area of the formed face. No allowance shall be made for irregularities, depressions or other local peculiarities.

***Itemisation***

7.34 Separate items shall be provided for presplitting and smooth blasting in accordance with General Principles paragraphs 3 and 4 and the following :

---



---

Group	Feature
-------	---------

- |   |   |
|---|---|
| I | <ol style="list-style-type: none"> <li>1. Presplitting.</li> <li>2. Smooth blasting.</li> </ol> |
|---|---|

***Presplitting and smooth blasting***

7.35 The items for presplitting and smooth blasting shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) blasting trials;
- (b) preparatory work for blasting;
- (c) notifying the Engineer when explosives are to be brought onto Site;
- (d) screens and other protective covers, and subsequent removal;
- (e) measuring and recording vibrations, and supplying one copy of records to the Engineer;
- (f) checking and adjusting accuracy of seismographs;
- (g) drilling shot holes at the appropriate position and inclination;
- (h) charging, stemming and blasting;
- (i) trimming.

## **SOFT SPOTS AND OTHER VOIDS**

***Units***

7.36 The unit of measurement shall be :

- (i) excavation of soft spots, filling of soft spots and other voids ..... cubic metre.

***Measurement***

7.37 The measurement of soft spots and other voids shall be the volume of the soft spot or void ordered by the Engineer to be excavated and/or filled. The measurement shall be made separately from the main excavation only where the volume :

- (a) below structures or foundations is less than 25.00 cubic metres;
- (b) below earthworks final surface in general excavation, or existing ground surface under areas of fill, is less than 100.00 cubic metres.

**Itemisation** 7.38 Separate items shall be provided for soft spots and other voids in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Excavation of soft spots.</li> <li>2. Filling of soft spots and other voids.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Below general excavation or areas of fill.</li> <li>2. Below structures.</li> <li>3. Below foundations.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. General fill material.</li> <li>2. Fine fill material.</li> <li>3. Granular fill material.</li> <li>4. Special fill material.</li> <li>5. Grade 10 concrete.</li> <li>6. Other stated fill material.</li> </ol>

**Excavation of soft spots** 7.39 The items for excavation of soft spots shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage** (a) disposal of excavated material.

**Filling of soft spots and other voids** 7.40 The items for filling of soft spots and other voids shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage** (a) material from any source and compaction;  
(b) formwork.

## STABILISATION OF SOFT SPOTS

**Units** 7.41 The unit of measurement shall be :  
(i) stabilisation of soft spots .....cubic metre.

**Measurement** 7.42 The measurement of stabilisation of soft spots shall be the volume of rock fill material ordered by the Engineer to be deposited and compacted.

7.43 The measurement of stabilisation of soft spots in intermediate areas of fill shall only be made separately where the volume :

- (a) below structures or foundations is less than 25.00 cubic metres;
- (b) below earthworks final surface in general excavation, or existing ground surface under areas of fill, is less than 100.00 cubic metres.

Where the limits set out in paragraph 7.43 are exceeded, the measurement shall be made under paragraphs 7.11 to 7.15 and 7.25 to 7.31.

**Itemisation**

- 7.44 Separate items shall be provided for stabilisation of soft spots in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Stabilisation of soft spots.

---

**Stabilisation of soft spots**

- 7.45 The items for stabilisation of soft spots shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) deposition, spreading, levelling and compaction;
- (b) trimming and shaping to required levels and contours.

**SUPPORTS LEFT IN EXCAVATION**

**Units**

- 7.46 The unit of measurement shall be :
- (i) supports left in excavation .....square metre.

**Measurement**

- 7.47 The measurement shall be the area of face ordered by the Engineer to be left with supports in position.

**Itemisation**

- 7.48 Separate items shall be provided for supports left in excavation in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Different types of supports left in excavation.

---

**Supports left in excavation**

- 7.49 The items for supports left in excavation shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) working around supports during deposition and compaction of fill material.

**COMPLETION OF EARTHWORKS FINAL SURFACE**

- Units** 7.50 The unit of measurement shall be :
- (i) completion of earthworks final surface .....square metre.
- Measurement** 7.51 The measurement of completion of earthworks final surface shall be the area calculated from the dimensions shown on the Drawings of all surfaces below roads and pavings and the like. Completion of earthworks final surface of rock fill material shall be measured separately only where rock fill material is specifically shown on the Drawings.
- Itemisation** 7.52 Separate items shall be provided for completion of earthworks final surface in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Surface of general fill material.</li> <li>2. Surface of fine fill material.</li> <li>3. Surface of granular fill material.</li> <li>4. Surface of special fill material.</li> <li>5. Surface of rock fill material.</li> <li>6. Surface of other stated fill material.</li> <li>7. Surface of rock cutting.</li> </ol>

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- Completion of earthworks final surface** 7.53 The items for completion of earthworks final surface shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) cleaning, trimming, regulating and rolling of the surface;
  - (b) sealing of the surface;
  - (c) trimming of rock excavations to formation and regulating;
  - (d) blinding of rock fill;
  - (e) proof rolling;
  - (f) protection.

## SECTION 8

### ROADS AND PAVINGS

#### SUB-BASE, ROADBASE AND REGULATING COURSE

- Units** 8.01 The units of measurement shall be :
- (i) sub-base .....cubic metre.
  - (ii) roadbase .....square metre.
  - (iii) regulating course .....tonne.
- Measurement** 8.02 The measurement of sub-base shall be the volume measured to the outlines shown on the Drawings.
- 8.03 The area of roadbase shall be measured at the top surface. No deduction shall be made for openings each not exceeding one square metre.
- Itemisation** 8.04 Separate items shall be provided for sub-base, roadbase and regulating course in accordance with General Principles paragraphs 3 and 4 and the following :
- 
- | Group | Feature   |
|-------|---|
| I     | 1. Sub-base.<br>2. Roadbase.<br>3. Regulating course. |
| II    | 1. Different types of material.                       |
| III   | 1. Different thicknesses of roadbase.                 |
- 
- Sub-base, roadbase and regulating course** 8.05 The items for sub-base, roadbase and regulating course shall, in accordance with General Preambles paragraph 2, include for:
- (a) preliminary trial areas not accepted as part of the permanent works;
  - (b) trials by the Contractor to demonstrate compaction methods different from those stated in the Contract;
  - (c) materials and attendance for sampling and testing carried out by the Engineer;
  - (d) grading, measuring, mixing and deposition of materials;
  - (e) spreading and compaction of deposited material in layers;
  - (f) making joints;
  - (g) curing cement treated materials;
  - (h) edge support;

- (i) protection and maintenance of surfaces;
- (j) shaping to cambers, falls and crowns;
- (k) sealing surfaces, priming and tack coats.

## FLEXIBLE SURFACING

- Units** 8.06 The unit of measurement shall be :
- (i) base course, wearing course, friction course, surface dressing .....square metre.
- Measurement** 8.07 The area of flexible surfacing shall be measured at the top surface. No deduction shall be made for openings each not exceeding one square metre.
- Itemisation** 8.08 Separate items shall be provided for flexible surfacing in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Base course.</li> <li>2. Wearing course.</li> <li>3. Friction course.</li> <li>4. Surface dressing.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types of material.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Different thicknesses.</li> <li>2. Different rates of spread.</li> </ul>

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- Flexible surfacing** 8.09 The items for flexible surfacing shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) preliminary trial areas not accepted as part of the permanent works;
  - (b) trial mixes;
  - (c) preparation and cleaning of surfaces to receive bituminous materials;
  - (d) grading, measuring, mixing and deposition of materials;
  - (e) spreading and compaction of deposited material in layers;
  - (f) sealing surfaces, priming and tack coats;
  - (g) making joints;
  - (h) edge support;
- (i) protection of kerbs, masking and unmasking of drainage channels, manhole and catchpit covers, gully gratings, expansion joints, road



- studs and road markings, and obtaining clean lines;
- (j) finishing up to abutting surfaces;
- (k) filling core holes and compacting;
- (l) protection and maintenance of surface;
- (m) shaping to cambers, falls and crowns;
- (n) removing excess chippings.

## SCARIFYING AND MILLING

- Units** 8.10 The unit of measurement shall be :
- (i) scarifying, milling .....square metre.
- Measurement** 8.11 The area of scarifying and milling shall be measured at the top surface. No deduction shall be made for openings each not exceeding one square metre.
- Itemisation** 8.12 Separate items shall be provided for scarifying and milling in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature   |
|-------|---|
| I     | 1. Scarifying.<br>2. Milling.   |
| II    | 1. Depth not exceeding 50 mm.<br>2. Depth exceeding 50 mm but not exceeding 100 mm and so on in steps of 50 mm. |
| III   | 1. Disposal of material.<br>2. Store material.<br>3. Deliver material to stated locations.                      |
- Scarifying and milling** 8.13 The items for scarifying and milling shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) protecting kerbs, channels, manhole and catch pit covers, gully gratings and expansion joints;
  - (b) loading into transport;
  - (c) finishing up to abutting surfaces.

## CONCRETE PAVEMENT

- Units** 8.14 The unit of measurement shall be :
- (i) concrete carriageway, concrete runway, other stated paved concrete areas .....square metre.

**Measurement** 8.15 The area of concrete pavement shall be measured at the top surface. No deduction shall be made for openings each not exceeding one square metre.

**Itemisation** 8.16 Separate items shall be provided for concrete pavement in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Concrete carriageway. 2. Concrete runway. 3. Other stated paved concrete areas.
II	1. Reinforced. 2. Unreinforced.
III	1. Different grades of concrete.
IV	1. Different thicknesses.

**Concrete pavement** 8.17 The items for concrete pavement shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) preliminary trial lengths not accepted as part of the permanent works;
  - (b) trial mixes;
  - (c) waterproof membrane underlay;
  - (d) longitudinal, expansion, contraction, warping and construction joints;
  - (e) formwork;
  - (f) mixing, depositing, spreading, compaction and finishing;
  - (g) reinforcement;
  - (h) concrete in infill slabs at covers, frames and other hardware;
  - (i) forming or sawing grooves, cleaning, caulking, temporary and permanent sealing of joints;
  - (j) surface texturing, curing and protection;
  - (k) forming recesses, openings and bays;
  - (l) shaping to falls;
  - (m) finishing up to abutting surfaces;
  
  - (n) preparing surfaces including removing existing concrete and joints;
  - (o) protection of completed pavement.

## PRECAST CONCRETE PAVING SLABS AND INTERLOCKING BLOCKS

**Units** 8.18 The unit of measurement shall be :

(i) precast concrete paving slabs, precast concrete interlocking blocks .....square metre.

**Measurement** 8.19 The area of precast concrete paving slabs and precast concrete interlocking blocks shall be measured at the top surface. No deduction shall be made for openings each not exceeding one square metre.

**Itemisation** 8.20 Separate items shall be provided for precast concrete paving slabs and interlocking blocks in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Precast concrete paving slabs. 2. Precast concrete interlocking blocks.
II	1. Different grades of concrete.
III	1. Different types of construction.

**Precast concrete paving slabs, etc.** 8.21 The items for precast concrete paving slabs and interlocking blocks shall, in accordance with General Preambles paragraph 2, include for :-

**Item coverage**

(a) laying and compacting sand bed;  
 (b) laying, bedding and compacting slabs or blocks, including all cutting;  
 (c) filling and compacting joints;  
 (d) mortar or concrete seal against abutting surfaces;  
 (e) removing and replacing damaged units;  
 (f) taking measures to prevent the ingress of water during laying, bedding and compaction;  
 (g) protection of formation.

## FOOTWAYS, CYCLETRACKS AND PAVED AREAS

- Units** 8.22 The unit of measurement shall be :
- (i) footways, cycletracks, paved areas .....square metre.
- Measurement** 8.23 The area of footways, cycletracks and paved areas shall be measured at the top surface. No deduction shall be made for openings each not exceeding one square metre.
- Itemisation** 8.24 Separate items shall be provided for footways, cycletracks and paved areas in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Footways. 2. Cycletracks. 3. Paved areas.
II	1. Different types of construction.
III	1. Different thicknesses.
IV	1. Different thicknesses of sub-base of stated types.

- Footways, cycletracks and paved areas** 8.25 The items for footways, cycletracks and paved areas shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) laying and compaction of sub-base;
  - (b) waterproof membrane underlay;
  - (c) grading, measuring, mixing, deposition, spreading and compaction;
  - (d) protection of kerbs, masking and unmasking of drainage channels, manholes and catchpit covers, gully gratings and expansion joints;
  - (e) sealing surfaces, priming and tack coats;
  - (f) formwork;
  - (g) reinforcement;
  - (h) bedding, jointing and pointing paving slabs or interlocking blocks including all cutting;
  - (i) making, filling and sealing joints;
  - (j) finishing up to abutting surfaces;
  - (k) surface texturing, curing and protection.

## KERBS, EDGINGS AND QUADRANTS

- Units**
- 8.26 The units of measurement shall be :
- (i) kerbs, edgings. ....linear metre.
  - (ii) quadrants, special kerb sections .....number.

- Itemisation**
- 8.27 Separate items shall be provided for kerbs, edgings and special kerb sections in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Kerbs.</li> <li>2. Edgings.</li> <li>3. Quadrants.</li> <li>4. Special kerb sections.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Different sizes.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Straight or curved not less than 10.00 m radius.</li> <li>2. Curved less than 10.00 m radius.</li> </ul>

- Kerbs, edgings, quadrants, etc.**
- 8.28 The items for kerbs, edgings, quadrants and special kerb sections shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) trial mixes;
  - (b) excavation in any material;
  - (c) disposal of surplus excavated material;
  - (d) formwork;
  - (e) reinforcement;
  - (f) foundation and backing;
  - (g) bedding, jointing, pointing and cutting;
  - (h) making, filling and sealing joints;
  - (i) keying of surfaces and tack coats;
  - (j) surface texturing, curing and protection;
  - (k) building in gully grating and frames and overflow weirs;
  - (l) reinstating and finishing to abutting surfaces.

## CONCRETE PROFILE BARRIERS

<b>Units</b>	8.29	The units of measurement shall be : <ul style="list-style-type: none"> <li>(i) concrete profile barriers .....linear metre.</li> <li>(ii) end sections to concrete profile barrier, special sections to concrete profile barrier .....number.</li> </ul>
<b>Measurement</b>	8.30	The measurement of concrete profile barriers shall be the length along their centreline.
<b>Itemisation</b>	8.31	Separate items shall be provided for concrete profile barriers in accordance with General Principles paragraphs 3 and 4 and the following :
	Group	Feature
	I	<ul style="list-style-type: none"> <li>1. Concrete profile barriers.</li> <li>2. End sections to concrete profile barrier.</li> <li>3. Special sections to concrete profile barrier.</li> </ul>
	II	<ul style="list-style-type: none"> <li>1. Different types or sizes.</li> </ul>
<b>Concrete profile barriers</b>	8.32	The items for concrete profile barriers shall, in accordance with General Preambles paragraph 2, include for :
<b>Item coverage</b>		<ul style="list-style-type: none"> <li>(a) trial mixes;</li> <li>(b) preliminary trial lengths not accepted as part of the permanent works;</li> <li>(c) materials and attendance for sampling and testing carried out by the Engineer;</li> <li>(d) foundation and backing;</li> <li>(e) formwork;</li> <li>(f) reinforcement;</li> <li>(g) lifting devices;</li> <li>(h) forming sockets, holes, grooves, rebates, recesses and overflow slots;</li> <li>(i) surface texturing, curing and protection;</li> <li>(j) hoisting and fixing in position;</li> <li>(k) bedding, jointing and pointing;</li> <li>(l) aligning units and adjusting levels;</li> <li>(m) joint filler, sealer and bond breaker;</li> <li>(n) service ducts and draw wires;</li> <li>(o) drain pipes;</li> <li>(p) filling and compaction to core;</li> <li>(q) concrete topping;</li> <li>(r) lamp standard sockets;</li> <li>(s) cover plates.</li> </ul>

## TRAFFIC SIGNS, TRAFFIC SIGN SUPPORTS, BOLLARDS AND MARKER POSTS

- Units** 8.33 The unit of measurement shall be :
- (i) traffic signs, traffic sign supports, bollards, marker posts .....number.
- Itemisation** 8.34 Separate items shall be provided for traffic signs, traffic sign supports, bollards and marker posts in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Traffic signs. 2. Traffic sign supports. 3. Bollards. 4. Marker posts.
II	1. Internally illuminated. 2. Externally illuminated. 3. Non-illuminated. 4. Retroreflective. 5. Non-retroreflective.
III	1. Different sizes. 2. Different materials.
IV	1. Different supports.
V	1. Traffic signs supplied by the Employer. 2. Traffic sign supports supplied by the Employer.

- Traffic signs, etc.** 8.35 The items for traffic signs, traffic sign supports, bollards and marker posts shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) excavation in any material;  
 (b) backfilling and compaction;  
 (c) disposal of surplus excavated material;  
 (d) formwork;  
 (e) reinforcement;  
 (f) concrete;  
 (g) steelwork, backing plates, light spill screens and the like;  
 (h) fixings and fittings;  
 (i) bolts, washers, nuts, screws, rivets and the like;
- (j) electrical installation and fittings;  
 (k) protective treatment and painting;

- (l) reinstatement of pavements and surrounding surfaces;
- (m) temporary screening of signs.

## SIGN GANTRIES

- Units** 8.36 The unit of measurement shall be :
- (i) sign gantries .....number.
- Itemisation** 8.37 Separate items shall be provided for sign gantries in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature                              |
|-------|--------------------------------------|
| I     | 1. Different types of sign gantries. |
- Sign gantries** 8.38 The items for sign gantries shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) excavation in any material;
  - (b) backfilling and compaction;
  - (c) disposal of surplus excavated material;
  - (d) formwork;
  - (e) reinforcement;
  - (f) concrete;
  - (g) fabrication of steelwork;
  - (h) erection of steelwork;
  - (i) protective treatment and painting;
  - (j) reinstatement of pavements and surrounding surfaces;
  - (k) temporary screening of signs.

## ROAD STUDS

- Units** 8.39 The unit of measurement shall be :
- (i) road studs .....number.
- Itemisation** 8.40 Separate items shall be provided for road studs in accordance with General Principles paragraphs 3 and 4 and the following :



Group	Feature
I	<ol style="list-style-type: none"> <li>1. Different types of road studs.</li> <li>2. Different sizes of road studs.</li> </ol>

**Road studs** 8.41 The items for road studs shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) forming holes and disposal of surplus material;
- (b) cleaning and preparing surfaces;
- (c) adhesives and grout;
- (d) reinstatement of pavements and surrounding surfaces.

## ROAD MARKINGS

**Units** 8.42 The units of measurement shall be :

- (i) lines .....linear metre.
- (ii) letters, characters, figures, symbols, arrows and the like .....number.

**Measurement** 8.43 The measurement of intermittent lines shall include unmarked intervals. Double lines shall be measured as two single lines. Ancillary lines shall include lines forming hatched areas, chevrons, zig-zag lines and boxed areas including their enclosing lines.

**Itemisation** 8.44 Separate items shall be provided for road markings in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Continuous lines.</li> <li>2. Intermittent lines.</li> <li>3. Ancillary lines.</li> <li>4. Letters, characters, figures and symbols.</li> <li>5. Arrows.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different materials and colours.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different lengths of marks and gaps for intermittent lines.</li> </ol>

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Group	Feature
IV	<ol style="list-style-type: none"> <li>1. Different widths of lines.</li> <li>2. Different heights of letters, characters figures and symbols.</li> <li>3. Different lengths of arrows.</li> </ol>
V	<ol style="list-style-type: none"> <li>1. Different types of arrows.</li> </ol>

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- Road markings** 8.45 The items for road markings shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) cleaning and preparing surfaces;
  - (b) tack coat;
  - (c) solid glass beads.

## REMOVAL OF EXISTING ROAD MARKINGS

- Units** 8.46 The units of measurement shall be :
- (i) removal of lines .....linear metre.
  - (ii) removal of letters, characters, figures, symbols, arrows and the like .....number.
- Measurement** 8.47 The measurement of removal of intermittent lines shall include unmarked intervals. Double lines shall be measured as two single lines. Ancillary lines shall include lines forming hatched areas, chevrons, zig-zag lines and boxed areas including their enclosing lines.
- Itemisation** 8.48 Separate items shall be provided for the removal of existing road markings in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
I	<ol style="list-style-type: none"> <li>1. Removal of continuous lines.</li> <li>2. Removal of intermittent lines.</li> <li>3. Removal of ancillary lines.</li> <li>4. Removal of letters, characters, figures and symbols.</li> <li>5. Removal of arrows.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different lengths of marks and gaps for intermittent lines.</li> </ol>

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Group	Feature
III	<ol style="list-style-type: none"><li>1. Different widths of lines.</li><li>2. Different heights of letters, characters, figures and symbols.</li><li>3. Different lengths of arrows.</li></ol>
IV	<ol style="list-style-type: none"><li>1. Different types of arrows.</li></ol>

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***Removal of  
existing road  
markings***

8.49 The items for removing existing road markings shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) providing temporary traffic signs;
- (b) protecting and making good any damage to existing surfacing.



## SECTION 9

### PILING WORKS

**Note** 9.01 Groundwater control, ground treatment and ground investigation works shall be measured in accordance with the units of measurement, measurements and itemisation set out in the relevant Sections for Ground Investigation and Geotechnical Works.

### PILING PLANT

**Units** 9.02 The units of measurement shall be :

(i) establishment of piling plant .....item.  
(ii) moving piling plant .....number.

**Measurement** 9.03 Establishment of piling plant shall be measured separately for each bridge or structure.

9.04 The measurement of moving piling plant shall be the number of piles shown on the Drawings or ordered by the Engineer. Any additional moves to suit the Contractor's method of working shall not be measured.

9.05 Moving of piling plant shall not be measured for steel sheet piling.

**Itemisation** 9.06 Separate items shall be provided for piling plant in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Establishment of piling plant. 2. Moving piling plant.
II	1. Piling plant for different types of pile.
III	1. Preliminary piling. 2. Main piling.

**Establishment of piling plant** 9.07 The items for the establishment of piling plant shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage** (a) bringing piling stagings, pile frames, drilling rigs and associated

- (b) erection of and setting up piling stagings, pile frames, drilling rigs and associated equipment including site preparation and levelling required for this purpose;
- (c) dismantling and removal of plant and equipment.

**Moving piling plant**

9.08 The items for moving piling plant shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) moving and setting up plant and equipment at each piling position including site preparation and levelling.

**CAST-IN-SITU CONCRETE PILES****Units**

9.09 The units of measurement shall be :

- (i) pile shafts, empty bores, extra over for permanent linings .....linear metre.
- (ii) extra over for breaking out obstructions .....cubic metre.
- (iii) extra over for enlarged bases, extra over for toeing-in to bedrock .....number.

**Measurement**

9.10 The measurement of pile shafts shall be the length of the pile measured along the axis from the specified level of the pile head to the toe of the pile shoe or the bottom of excavation including any enlarged base as required by the Engineer, whichever is appropriate.

9.11 Where an empty bore is specified above a pile shaft, the length classification of the pile shaft shall be based on the overall excavated depth including the empty bore. Empty bores shall only be measured when commencement levels are specified and shall be the length of the empty bore from the specified level of the pile head to the specified commencement level.

9.12 The measurement of extra over for breaking out obstructions shall be the volume of the voids formed by the removal of rock (except bedrock), boulders, artificial hard material and the like, which can only be removed by special plant or explosives and which is within the specified cross section of the pile or enlarged base.

9.13 The measurement of extra over for permanent lining shall be the length of the permanent lining shown on the Drawings or ordered by the Engineer.

**Itemisation**

9.14 Separate items shall be provided for cast-in-situ concrete piles in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
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- |      |   |
|------|---|
| I    | <ol style="list-style-type: none"> <li>1. Pile shafts.</li> <li>2. Empty bores.</li> <li>3. Extra over for breaking out obstructions.</li> <li>4. Extra over for enlarged bases.</li> <li>5. Extra over for toeing-in to bedrock.</li> <li>6. Extra over for permanent linings of specified thickness.</li> </ol> |
| II   | <ol style="list-style-type: none"> <li>1. Vertical.</li> <li>2. Raking.</li> </ol>  |
| III  | <ol style="list-style-type: none"> <li>1. Blasting permitted.</li> <li>2. Blasting not permitted.</li> </ol>  |
| IV   | <ol style="list-style-type: none"> <li>1. Compressed air permitted.</li> <li>2. Compressed air not permitted.</li> </ol>  |
| V    | <ol style="list-style-type: none"> <li>1. Different types.</li> </ol>   |
| VI   | <ol style="list-style-type: none"> <li>1. Different materials.</li> </ol>   |
| VII  | <ol style="list-style-type: none"> <li>1. Different cross sections.</li> </ol>  |
| VIII | <ol style="list-style-type: none"> <li>1. Pile shafts not exceeding 5.00 m in length.</li> <li>2. Pile shafts exceeding 5.00 m but not exceeding 10.00 m in length and so on in steps of 5.00 m.</li> </ol>   |
| IX   | <ol style="list-style-type: none"> <li>1. Extra over for toeing-in not exceeding 0.50 m in depth.</li> <li>2. Extra over for toeing-in exceeding 0.50 m but not exceeding 1.00 m in depth and so on in steps of 0.50 m.</li> </ol>  |
| X    | <ol style="list-style-type: none"> <li>1. Preliminary piling.</li> <li>2. Main piling.</li> </ol>   |

***Pile shafts***

9.15 The items for pile shafts shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) pre-boring and jetting;
- (b) determining the positions of and exposing underground utilities adjacent to piles before piling work commences;

- (c) taking all necessary measures to minimise the settlement of ground and adjacent structures and utilities, and to prevent the formation of cavities in the ground resulting from piling works;
- (d) monitoring the noise levels, vibration, ground movement and groundwater levels, taking records and measurements and supplying one copy to the Engineer;
- (e) grouting trials;
- (f) boring, augering or excavating including any casing or lining, removing and disposing of material excavated from the bore, or alternatively, driving casings or linings with or without pile shoes;
- (g) removal of temporary casings or linings;
- (h) slurry or drilling fluids and subsequent disposal;
- (i) ventilation and lighting;
- (j) in the case of barrette piles, provision, maintenance and removal of guide walls and slurry heads;
- (k) provision of apparatus for the inspection of pile excavation or inside of pile casing, taking observations and maintaining the boring or driving record of each pile and supplying one copy to the Engineer;
- (l) forming the pile including grout, in-situ concrete, precast concrete units and the like;
- (m) casting in tubes for sonic testing;
- (n) cutting back concrete to form bond and/or trimming to required finished level;
- (o) taking all measures required due to the presence of water in the bore or drive;
- (p) taking undisturbed soil or rock samples from the bore at any level;
- (q) proving founding level;
- (r) temporary filling above and around the tops of piles and subsequent removal;
- (s) cleaning base of excavation and removing all loose material from bore prior to concreting;
- (t) taking all necessary measures to prevent excavated material, slurry or boring fluids from contaminating the Site or adjacent areas, or entering any drainage system or watercourse;
- (u) test boring;
- (v) submitting records of bentonite slurry and concrete, excavation records and record drawings;
- (w) in the case of blasting being permitted, blasting trials, explosives, measurement and recording of vibrations and supplying copy of records to the Engineer, checking and adjusting accuracy of seismographs, preparatory work for blasting, notifying the Engineer when explosives are to be brought onto the Site, screens and other protective covers, drilling shot holes, charging, stemming and blasting.

***Empty bores***

9.16 The items for empty bores shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) pre-boring and jetting;
- (b) determining the position of and exposing underground utilities



- adjacent to piles before piling work commences;
- (c) taking all necessary measures to minimise the settlement of ground and adjacent structures and utilities, and to prevent the formation of cavities in the ground resulting from piling works;
- (d) monitoring the noise levels, vibration, ground movement and groundwater levels, taking records and measurements and supplying one copy to the Engineer;
- (e) boring, augering or excavating including any casing or lining, removing and disposing of material excavated from the bore, or alternatively, driving casings or linings with or without pile shoes;
- (f) slurry or drilling fluids and subsequent disposal;
- (g) ventilation and lighting;
- (h) removal of temporary casings or linings;
- (i) provision of apparatus for the inspection of pile excavation or inside of pile casing, taking observations and maintaining the boring or driving record of each pile and supplying one copy to the Engineer;
- (j) taking all measures required due to the presence of water in the bore or drive;
- (k) taking undisturbed soil or rock samples from the bore at any level;
- (l) temporary protection or temporary filling of empty bore;
- (m) taking all necessary measures to prevent excavated material, slurry or drilling fluids from contaminating the Site or adjacent areas, or entering any drainage system or watercourse.

***Extra over for breaking out obstructions***

9.17 The items for extra over for breaking out obstructions shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) provision, maintenance and removal of specialist equipment;
- (b) explosives;
- (c) overbreak and making good.

***Extra over for enlarged bases***

9.18 The items for extra over for enlarged bases shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) under-reaming to enlarge the base, and removing and disposing of material excavated;
- (b) placing and compaction of additional concrete or other material required to fill or form the enlarged base;
- (c) taking all measures required due to the presence of water.

***Extra over for toeing-in to bedrock***

9.19 The items for extra over for toeing-in to bedrock shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) boring, augering, drilling or chiselling into bedrock;
- (b) trimming the bottom and sides of the toeing-in, and clearing away loose rock;
- (c) overbreak and making good;
- (d) provision of facilities for rock samples to be taken from the bottom of the bore.

**Extra over for permanent linings**

9.20 The items for extra over for permanent linings shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) fabricating;
- (b) protective coatings or surface treatments;
- (c) handling, pitching and installing;
- (d) filling voids between linings and excavated faces.

**REINFORCEMENT FOR CAST-IN-SITU CONCRETE PILES**

**Units**

9.21 The unit of measurement shall be :

- (i) bar reinforcement, helical reinforcement .....tonne.

**Measurement**

9.22 The measurement of reinforcement shall include the reinforcement specified to be cast into the pile and required to bond into the substructure.

9.23 The weight of plain bar reinforcement shall be calculated on the basis that steel weighs 0.00785 kilogram per square millimetre of cross sectional area per linear metre. The weight of deformed bar reinforcement shall be calculated from the nominal rolling mass of the reinforcement. Steel bar supports to reinforcement where shown on the Drawings shall be measured as reinforcement.

**Itemisation**

9.24 Separate items shall be provided for reinforcement for cast-in-situ concrete piles in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Bar reinforcement.</li> <li>2. Helical reinforcement.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Mild steel.</li> <li>2. High yield steel.</li> <li>3. Stainless steel.</li> </ul>

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Group	Feature
III	<ul style="list-style-type: none"> <li>1. Different diameters.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Bars not exceeding 12.00 m in length.</li> </ul>

- 
2. Bars exceeding 12.00 m but not exceeding 15.00 m in length and so on in steps of 3.00 m.
- 

<b>Reinforcement</b>	9.25	The items for reinforcement shall, in accordance with General Preambles paragraph 2, include for :
<b>Item coverage</b>		<ul style="list-style-type: none"> <li>(a) cleaning, cutting and bending;</li> <li>(b) tying with tying wire, tying devices or clips;</li> <li>(c) welding;</li> <li>(d) supports and spacers (except for steel bar supports to reinforcement where shown on the Drawings);</li> <li>(e) reinforcement connectors;</li> <li>(f) protection of projecting reinforcement;</li> <li>(g) lifting bars, supporting steel or lifting yokes for prefabricated reinforcement cages.</li> </ul>

## PRECAST CONCRETE PILES

<b>Units</b>	9.26	The units of measurement shall be : <ul style="list-style-type: none"> <li>(i) precast concrete piles, driving precast concrete piles .....linear metre.</li> <li>(ii) stripping pile heads .....number.</li> </ul>
<b>Measurement</b>	9.27	The measurement of precast concrete piles shall be the length of the pile from the toe or tapered point to the specified cut-off level.
	9.28	The measurement of driving precast concrete piles shall be the length of the pile measured from the toe or tapered point to the existing ground surface or the level of the underside of the pile cap (excluding any blinding layer), whichever is the lower. Provided that where a particular level is specified from which driving shall commence, then the measurement shall be to that specified level.
<b>Itemisation</b>	9.29	Separate items shall be provided for precast concrete piles in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Precast concrete piles.</li> <li>2. Driving precast concrete piles.</li> <li>3. Stripping pile heads.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Vertical.</li> <li>2. Raking.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different types.</li> </ol>
IV	<ol style="list-style-type: none"> <li>1. Different materials.</li> </ol>
V	<ol style="list-style-type: none"> <li>1. Different cross sections.</li> </ol>
VI	<ol style="list-style-type: none"> <li>1. Piles not exceeding 5.00 m in length.</li> <li>2. Piles exceeding 5.00 m but not exceeding 10.00 m in length and so on in steps of 5.00 m.</li> </ol>
VII	<ol style="list-style-type: none"> <li>1. Preliminary piling.</li> <li>2. Main piling.</li> </ol>

***Precast concrete piles***

9.30 The items for precast concrete piles shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) formwork;
- (b) reinforcement;
- (c) concrete;
- (d) pile shoes, tapered points, chamfers, prefabricated joints, joint fittings, lifting points and reference markings;
- (e) making pile joints within the precast concrete pile lengths;
- (f) keeping records of each pile and submitting to the Engineer.

***Driving precast concrete piles***

9.31 The items for driving precast concrete piles shall, in accordance with General Preamble paragraph 2, include for :

***Item coverage***

- (a) pre-boring and jetting;
- (b) determining the position of and exposing underground utilities adjacent to piles before piling work commences;
- (c) taking all necessary measures to minimise the settlement of ground and adjacent structures and utilities, and to prevent the formation of cavities in the ground resulting from piling works;

- (d) monitoring the noise levels, vibration, ground movement and groundwater levels, taking records and measurements and supplying one copy to the Engineer;
- (e) handling, pitching and driving to the given set or level including temporary supports and any necessary guide arrangements;
- (f) taking observations, compilation and analysis of the record of each pile, and supplying report to the Engineer;
- (g) re-establishing and moving plant and equipment and redriving risen piles;
- (h) re-establishing and moving plant and equipment to correct displaced piles;
- (i) extracting preliminary pile.

***Stripping pile heads***

9.32 The items for stripping pile heads shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) cutting off and disposal of surplus length of pile;
- (b) stripping concrete from the head to the required level and exposing the reinforcement required for bonding into the substructure;
- (c) bending the projecting reinforcement as necessary to bond into the substructure;
- (d) protective treatment;
- (e) capping plates, reinforcement, infill concrete and the like.

## **STEEL BEARING PILES**

***Units***

9.33 The units of measurement shall be :

- (i) steel bearing piles, driving steel bearing  
piles .....linear metre.
- (ii) pile heads .....number.

***Measurement***

9.34 The measurement of steel bearing piles shall be the length of the pile from the toe or tapered point to the specified cut-off level.

9.35 The measurement of driving steel bearing piles shall be the length of the pile measured from the toe or tapered point to the existing ground surface or the level of the underside of the pile cap (excluding any blinding layer), whichever is the lower. Provided that where a particular level is specified from which driving shall commence, then the measurement shall be to that specified level.

***Itemisation***

9.36 Separate items shall be provided for steel bearing piles in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Steel bearing piles. 2. Driving steel bearing piles. 3. Pile heads.
II	1. Vertical. 2. Raking.
III	1. Different types.
IV	1. Preliminary piling. 2. Main piling.

***Steel bearing piles***

9.37 The items for steel bearing piles shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) fabrication, pile shoes, tapered points, slinging holes and reference markings;
- (b) protective coatings and other surface treatment;
- (c) jointing and welding;
- (d) cutting or burning off surplus;
- (e) keeping records of each pile and submitting to the Engineer.

***Driving steel bearing piles***

9.38 The items for driving steel bearing piles shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) pre-boring and jetting;
- (b) determining the position of and exposing underground utilities adjacent to piles before piling work commences;
- (c) taking all necessary measures to minimise the settlement of ground and adjacent structures and utilities, and to prevent the formation of cavities in the ground resulting from piling works;
- (d) monitoring the noise levels, vibration, ground movement and groundwater levels, taking records and measurements and supplying one copy to the Engineer;
- (e) handling, pitching and driving to a given set or penetration, including temporary supports and any necessary guide arrangements;
- (f) taking observations, compilation and analysis of the record of each pile, and supplying report to the Engineer;
- (g) re-establishing and moving plant and equipment and re-driving risen piles;
- (h) re-establishing and moving plant and equipment to correct displaced piles;
- (i) strengthening of the pile to accommodate driving stresses;

- (j) extracting preliminary pile.

**Pile heads** 9.39 The items for pile heads shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) preparation of pile and capping plates;
  - (b) protective treatment;
  - (c) in the case of the heads of piles being encased in concrete, removal of protective coating and other surface treatments.

## STEEL SHEET PILING

**Units** 9.40 The units of measurement shall be :

- (i) steel sheet piling, driving steel sheet piling, steel sheet piling extensions, driving steel sheet piling extensions .....square metre.
- (ii) welding on extensions, cutting or burning off surplus, extra over for special steel piles, extra over for driving special steel piles, extra over for special steel pile extensions, extra over for driving special steel pile extensions .....linear metre.
- (iii) forming openings .....number.
- (iv) steel waling, struts and ties .....tonne.

**Measurement** 9.41 The measurement of steel sheet piling shall be the plane (not developed) horizontal length along the centreline of the piling multiplied by the vertical length shown on the Drawings or ordered by the Engineer.

9.42 The measurement of driving steel sheet piling shall be the plane (not developed) horizontal length along the centreline of the piling multiplied by the depth from the toe to :

- (a) the existing ground surface or the specified cut off level of the pile, whichever is the lower. Provided that where a particular level is specified from which driving shall commence, then the measurement shall be to that specified level; or
- (b) the site joint of piles to be extended provided that the site joint after completion of driving is below the level determined in accordance with paragraph 9.42(a).

9.43 The measurement of steel sheet piling extensions shall be the plane (not developed) horizontal length along the centreline of the piling multiplied by the length ordered by the Engineer.

9.44 The measurement of driving steel sheet piling extensions shall be the plane (not developed) horizontal length along the centreline of the piling multiplied by the depth from the site joint to the level determined in accordance with paragraph 9.42.

9.45 The measurement of welding on extensions and cutting or burning off surplus shall be the plane (not developed) horizontal length along the centreline of the

piling.

- 9.46 The measurement of steel waling, struts and ties shall be the total weight of the finished member comprising plates, rolled sections, shear connectors, stiffeners, cleats, packs, splice plates and all fittings computed in accordance with the relevant British Standard, with no allowance for tolerances for rolling margins and other permissible deviations from standard weights, and excluding the weights of weld fillets, bolts, nuts and washers, rivet heads and protective coatings. No deduction shall be made for splays, notches, holes and the like each not exceeding 0.10 square metres.

***Itemisation***

- 9.47 Separate items shall be provided for steel sheet piling in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Steel sheet piling.</li> <li>2. Driving steel sheet piling.</li> <li>3. Steel sheet piling extensions.</li> <li>4. Driving steel sheet piling extensions.</li> <li>5. Extra over for special steel piles.</li> <li>6. Extra over for driving special steel piles.</li> <li>7. Extra over for special steel pile extensions.</li> <li>8. Extra over for driving special steel pile extensions.</li> <li>9. Welding on extensions.</li> <li>10. Cutting or burning off surplus.</li> <li>11. Steel waling, struts and ties.</li> <li>12. Forming openings.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Piles not exceeding 5.00 m in length.</li> <li>2. Piles exceeding 5.00 m but not exceeding 10 m in length and so on in steps of 5.00 m.</li> </ol>

***Steel sheet piling and extensions, etc.***

- 9.48 The items for steel sheet piling, steel sheet piling extensions, extra over for special steel piles and extra over for special steel pile extensions shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) fabrication, lifting holes, tapered points and reference markings;
- (b) protective coatings or other surface treatment;
- (c) welding joints within the steel sheet piling and special steel pile lengths shown on the Drawings or ordered by the Engineer;
- (d) forming weepholes;
- (e) keeping records of each pile and submitting to the Engineer.



- Driving steel sheet piling and extensions, etc.***
- 9.49 The items for driving steel sheet piling, driving steel sheet piling extensions, extra over for driving special steel piles and extra over for driving special steel pile extensions shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage***
- (a) determining the position of and exposing underground utilities adjacent to the piles before piling work commences;
  - (b) taking all necessary measures to minimise the settlement of ground and adjacent structures and utilities, and to prevent the formation of cavities in the ground resulting from piling works;
  - (c) handling, pitching and driving to a given set or penetration, including temporary supports and any necessary guide arrangements;
  - (d) moving and setting up plant and equipment at each pile position including site preparation or levelling;
  - (e) taking observations and compilation of the record of piling, and supplying one copy to the Engineer;
  - (f) re-establishing and moving plant and equipment and re-driving risen piles;
  - (g) re-establishing and moving plant and equipment to correct displaced piles;
  - (h) extraction if required.
- Welding on extensions***
- 9.50 The items for welding on extensions shall, in accordance with General Preambles paragraph 2, include for:
- Item coverage***
- (a) preparation of the head of the driven pile;
  - (b) cleaning the affected area and applying protective coatings or other surface treatment;
  - (c) moving plant and equipment;
  - (d) inspection and testing of welds.
- Cutting or burning off surplus***
- 9.51 The items for cutting or burning off surplus shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage***
- (a) disposal of surplus length of pile;
  - (b) cleaning the affected area and applying protective coatings or other surface treatment.
- Steel waling, struts and ties***
- 9.52 The items for steel waling, struts and ties shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage***
- (a) fabrication, handling and fixing including necessary excavation, backfilling, compaction and disposal of surplus excavated material;
  - (b) nuts, bolts, washers, plates, couplings, turn buckles and the like;
  - (c) marking off, cutting, welding, drilling and the like;
  - (d) protective coatings or other surface treatment;
  - (e) removal if required.

**Forming openings** 9.53 The items for forming openings shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) marking off and cutting or burning;
  - (b) cleaning the affected area and applying protective coatings or other surface treatment.

**DEALING WITH OBSTRUCTIONS (DRIVEN PILES)**

**Units** 9.54 The unit of measurement shall be :

- (i) dealing with obstructions .....hour.

**Measurement** 9.55 The measurement of dealing with obstructions shall be the time during which the equipment to extract, overcome or break out the obstruction is in operation.

**Itemisation** 9.56 Separate items shall be provided for dealing with obstructions in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Dealing with obstructions.
II	1. Different types of pile.
III	1. Different sizes of pile.
IV	1. Preliminary piling. 2. Main piling.

**Dealing with obstructions** 9.57 The items for dealing with obstructions shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) provision of all necessary equipment and subsequent removal;
  - (b) moving plant and equipment;
  - (c) extraction of driven pile;
  - (d) loading into transport and disposal of material.

## SECTION 10

### FORMWORK

#### FORMWORK

#### *Units*

10.01 The units of measurement shall be :

- (i) formwork .....square metre.
- (ii) void formers .....linear metre.

#### *Measurement*

10.02 The measurement of formwork shall, subject to the qualifications stated below, be the area of formwork which is in contact with the finished concrete, but no deduction shall be made for openings in the formwork each not exceeding one square metre.

Formwork shall not be measured :

- (a) to construction joints;
- (b) to holes, ducts, pockets, sockets, mortices and the like not exceeding 0.15 cubic metres each in volume;
- (c) to individual fillets, chamfers, splays, drips, rebates, recesses, grooves and the like not exceeding 100 millimetres total girth measured on the faces in contact with the concrete;
- (d) to edge of concrete in blinding layers;
- (e) to upper surfaces of concrete inclined at an angle of 15° or less to the horizontal.

10.03 Where concrete other than blinding concrete is placed in structural foundations, formwork shall be measured to the sides of such concrete foundations regardless of whether any formwork is used, except where it is expressly stated on the Drawings that the concrete is to be cast against the soil face.

10.04 The measurement of profiled formwork shall be the plane (not developed) area of the profiled concrete as shown on the Drawings. Where such formwork is bounded by strips of plain finish not exceeding 300 millimetres wide, these strips shall be measured as profiled formwork.

10.05 Formwork at movement joints shall be measured to one face only.

10.06 Curved formwork shall be measured separately only where the face of the formwork in contact with the concrete is curved to a radius of 12.00 metres or less.

#### *Itemisation*

10.07 Separate items shall be provided for formwork in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Formwork.</li> <li>2. Profiled formwork.</li> <li>3. Void formers.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Exceeding 300 mm wide, horizontal or at any inclination up to and including 5° to the horizontal.</li> <li>2. Exceeding 300 mm wide, at any inclination more than 5° up to and including 85° to the horizontal.</li> <li>3. Exceeding 300 mm wide, at any inclination more than 85° up to and including 90° to the horizontal.</li> <li>4. Not exceeding 300 mm wide at any inclination.</li> <li>5. Curved, girth and width exceeding 300 mm, at any inclination.</li> <li>6. Curved, girth or width not exceeding 300 mm, at any inclination.</li> <li>7. Domed.</li> <li>8. Void formers of different cross section.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different classes of finish.</li> <li>2. Different types of permanent formwork.</li> <li>3. Different types of void formers.</li> </ol>

**Formwork**

10.08 The items for formwork shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) falsework, fabrication, erection, centering, levelling and fixing in position, and taking all measures necessary to produce the required shapes of concrete;
- (b) forming cambers and falls;
- (c) ties and components;
- (d) linings, release agents, surface retarders or other measures necessary to produce the required finish to the surfaces of the concrete;
- (e) cutting and fitting around projecting members, pipes, reinforcement and the like;
- (f) individual fillets, chamfers, splays, drips, rebates, recesses, grooves and the like, not exceeding 100 millimetres total girth measured on the faces in contact with the concrete;
- (g) sealing joints between formwork panels and adjoining surfaces and components;
- (h) striking, taking down and removing;
- (i) protection of concrete surfaces;
- (j) any additional concrete provided in lieu of formwork to fill overbreak or working space;
  
- (k) construction and subsequent removal of trial panels, including concrete, formwork and reinforcement.

***Void formers***

10.09 The items for void formers shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) fixing void formers to prevent displacement during concrete operations;
- (b) capping or blocking off ends;
- (c) sealing ends and joints;
- (d) cutting and fitting around projecting members, pipes, reinforcement and the like;
- (e) where required, removal of void formers.



## SECTION 11

### STEEL REINFORCEMENT

#### REINFORCEMENT

- Units** 11.01 The units of measurement shall be :
- (i) bar reinforcement, helical reinforcement .....tonne.
  - (ii) fabric reinforcement .....square metre.
  - (iii) dowels .....number.
- Measurement** 11.02 The mass of plain bar reinforcement shall be calculated on the basis that steel weighs 0.00785 kilogram per square millimetre of cross sectional area per linear metre. The mass of deformed bar reinforcement shall be calculated from the nominal rolling mass of the reinforcement. Steel bar supports to reinforcement where shown on the Drawings shall be measured as reinforcement.
- 11.03 Fabric reinforcement shall be measured as the area of fabric excluding laps. No deduction shall be made for openings each not exceeding one square metre.
- Itemisation** 11.04 Separate items shall be provided for reinforcement in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Bar reinforcement.</li> <li>2. Fabric reinforcement.</li> <li>3. Helical reinforcement.</li> <li>4. Dowels.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Mild steel.</li> <li>2. High yield steel.</li> <li>3. Stainless steel.</li> <li>4. Galvanised steel.</li> <li>5. Epoxy coated steel.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different diameters of bar and helical reinforcement.</li> <li>2. Different B.S. references of fabric reinforcement.</li> <li>3. Different diameters and lengths of dowels.</li> </ol>

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Group	Feature
IV	<ol style="list-style-type: none"> <li>1. Bars not exceeding 12.00 m in length.</li> <li>2. Bars exceeding 12.00 m but not exceeding 15.00 m in length and so on in steps of 3.00 m.</li> <li>3. Dowels with different accessories.</li> </ol>

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**Reinforcement** 11.05 The items for reinforcement shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) cleaning, cutting and bending;
- (b) tying with tying wire, tying devices or clips;
- (c) welding;
- (d) supports and spacers (except for steel bar supports to reinforcement where shown on the Drawings);
- (e) reinforcement connectors;
- (f) extra fabric reinforcement at laps;
- (g) protection of projecting reinforcement;
- (h) lifting bars, supporting steel or lifting yokes for prefabricated reinforcement cages;
- (i) repairing damage to protective coatings on, and patching cut ends of, reinforcement;
- (j) preparing bending schedules.

**Dowels** 11.06 The items for dowels shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) drilling holes or forming pockets, casting in and grouting;
- (b) caps, sleeves, wrappings, coatings, compressible filler and the like.



## SECTION 12

### CONCRETE

#### IN-SITU CONCRETE

- Units** 12.01 The unit of measurement shall be :
- (i) concrete .....cubic metre.
- Measurement** 12.02 No deduction shall be made for :
- (a) built-in items, holes, ducts, pockets, sockets, mortices and the like each not exceeding 0.15 cubic metres in volume;
- (b) reinforcement;
- (c) individual fillets, chamfers, splays, drips, rebates, recesses, grooves and the like not exceeding 100 millimetres in girth measured on the faces in contact with the formwork;
- (d) in the case of concrete with profiled face, any indentations of 100 millimetres total girth or less when measured in contact with the profiled formwork.
- Itemisation** 12.03 Separate items shall be provided for in-situ concrete in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | 1. Different grades of concrete.                         |
| II    | 1. Different types of cement.<br>2. Pulverised fuel ash. |
| III   | 1. Blinding concrete.<br>2. No-fines concrete.           |
- Concrete** 12.04 The items for concrete shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) trial mixes and plant trials;
- (b) mixing, placing in or against any surface, including soil faces where required, compaction and finishes to unformed surfaces;
- (c) curing and protection;
- (d) formwork to upper surfaces inclined at an angle of 15° or less to the horizontal;
- (e) falls, cambers and shaped profiles;

- (f) weep pipes, pipe sleeves and the like;
- (g) construction joints (whether shown or not on the Drawings), skewbacks, stunt ends, steppings, bonding chases and the like, including formwork, waterbars and waterstops;
- (h) holes, pockets, mortices casting in items and the like, each not exceeding 0.15 cubic metres in volume, including formwork;
- (i) ducts and sockets;
- (j) formwork to blinding concrete;
- (k) concrete to fill over-break and working space;
- (l) filling of tie bar holes;
- (m) underlay and sliding layers;
- (n) admixtures;
- (o) dealing with water in watercourses;
- (p) in the case of concrete placed in water, use of tremie or placing concrete in bags;
- (q) in the case of water retaining structures, building in puddle flanges and waterstops around box-outs.

**PRECAST CONCRETE**

*Note* 12.05 The term "precast" applies to any concrete unit cast on Site but not in its final position and to concrete units manufactured off the Site.

*Units* 12.06 The units of measurement shall be :

- (i) precast copings and the like of uniform cross section .....linear metre.
- (ii) precast members, slabs, units and specially moulded blocks .....number.

*Itemisation* 12.07 Separate items shall be provided for precast concrete in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Precast copings.</li> <li>2. Precast members, slabs, units and specially moulded blocks.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Different sizes.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Curved.</li> </ul>

*Precast concrete* 12.08 The items for precast concrete shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) trial mixes and plant trials;
- (b) formwork;
- (c) reinforcement;
- (d) surface finishing, curing and protection;
- (e) treatment to concrete faces;
- (f) fillets, chamfers, splays, drips, rebates, recesses, grooves and the like;
- (g) forming holes, ducts, pockets, sockets, mortices and the like, and casting-in items as required, including formwork;
- (h) matching members as required for side by side construction;
- (i) marking members for identification, date of casting and lifting points and delivery in matching sequence;
- (j) lifting devices, bearing plates and removal;
- (k) erection and fixing in final position;
- (l) temporary supports and connections to prevent displacement;
- (m) bedding, jointing and pointing, including cramps, dowels or other fixing devices;
- (n) caulking and sealing between and under units and members, including formwork;
- (o) cutting and trimming;
- (p) in the case of the precast prestressed members and the like, ducts, tendons and stressing (including partially stressing) and grouting internal tendons;
- (q) in the case of precast and precast prestressed members and the like, for incorporation in in-situ post tensioned prestressed construction, forming and installing tendon ducts to profile and sealing, forming recesses in the concrete for anchorages and jack seatings, bearing plates, reinforcing helices, grout inlets, vents and other components, including casting in;
- (r) dealing with water in watercourses.

**TREATMENT TO FACES OF IN-SITU CONCRETE****Units**

12.09 The unit of measurement shall be :

- (i) treatment to faces of in-situ concrete ..... square metre.

**Measurement**

12.10 The measurement shall be the area of the treated face shown on the Drawings, except for concrete faces formed with profiled formwork in which case the measurement shall be the same area as that for the profiled formwork.

**Itemisation**

12.11 Separate items shall be provided for treatment to faces of in-situ concrete in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	<ol style="list-style-type: none"><li>1. Exposed aggregate.</li><li>2. Point tooled.</li><li>3. Bush hammered.</li><li>4. Broken rib.</li><li>5. Light blasting.</li><li>6. Heavy blasting.</li><li>7. Other stated treatments.</li></ol>

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***Treatment of in-situ concrete***

12.12 The items for treatment to faces of in-situ concrete shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) removing loose material from the concrete and washing clean;
- (b) for exposed aggregate finishes, the subsequent treatment of the surfaces upon removal of the coated formwork to obtain the required finish;
- (c) in the case of light and heavy blasting, protection of adjacent surfaces and control of dust;
- (d) protection of treated surfaces;
- (e) construction and subsequent removal of trial panels.

## SECTION 13

### IN-SITU POST TENSIONED PRESTRESSING

#### IN-SITU POST TENSIONED PRESTRESSING

**Note** 13.01 For the purpose of this Section a tendon is defined as all the permanent components of a system which imparts a compressive load to a concrete member through a common anchorage or bearing plate.

**Units** 13.02 The unit of measurement shall be :

(i) tendons, stressing and grouting, protective covering to external tendons .....number.

**Measurement** 13.03 Lengths of tendons shall be measured along the line of the tendon between the outside faces of those parts of the anchorage units cast into the concrete. Tendons shall be grouped so that no member of the group differs in length from the stated length by more than 5%.

**Itemisation** 13.04 Separate items shall be provided for in-situ post tensioned prestressing in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Tendons.</li> <li>2. Stressing and grouting internal tendons.</li> <li>3. Stressing external tendons.</li> <li>4. Final stressing and grouting tendons of members supplied partially prestressed.</li> <li>5. Protective covering to external tendons.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Tendons for in-situ concrete construction.</li> <li>2. Tendons for segmental construction.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different types of tendons.</li> <li>2. Different types or sizes of external protective coverings.</li> </ol>
IV	<ol style="list-style-type: none"> <li>1. Longitudinal tendons.</li> <li>2. Transverse tendons.</li> <li>3. Tendons in any other direction.</li> </ol>
V	<ol style="list-style-type: none"> <li>1. Different stated lengths of tendons.</li> </ol>

**Tendons** 13.05 The items for tendons shall, in accordance with General Preambles paragraph 2,

include for :

***Item coverage***

- (a) forming and installing grout vents and tendon ducts to profile or between precast segmental units and sealing;
- (b) steel bars, cables, wires or strands with couplers, binders, spacers and proving that tendons are free to move between anchorages in ducts;
- (c) tendon anchorages, bearing plates, reinforcing helices, grout inlets, vents and other components, except where these are supplied complete with precast members or segments;
- (d) forming recesses in the concrete for anchorages and jack seatings;
- (e) allowing for variations of length in tendons contained in the same bill item;
- (f) cleaning tendons, components and ducts.

***Stressing and grouting internal tendons, etc.***

13.06 The items for stressing and grouting internal tendons, stressing external tendons, and final stressing and grouting tendons of members supplied partially prestressed shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) checking and calibrating tensioning apparatus and load measuring devices;
- (b) trial mixes of grout and grouting trials;
- (c) applying pre-stress in one or more stages;
- (d) gripping and trimming tendons;
- (e) taking observations and compiling a record of stressing and grouting operations and supplying results to the Engineer;
- (f) for internal tendons, grouting, sealing vent holes and end anchorages, treating ends of tendons, and filling anchorages and jack seating recesses with in-situ concrete;
- (g) accommodating and adjusting for differences between tendons included in the same bill item;
- (h) calculation in respect of the required jacking force and extension;
- (i) releasing tension and re-tensioning where pull-in varies from that agreed by the Engineer;
- (j) temporary protection to external prestressing tendons and anchorages and subsequent removal.

***Protective covering to external tendons***

13.07 The items for protective covering to external tendons shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) placing and completing protective covering to whole length of tendon, including formwork and temporary supports;
- (b) tying or bonding to main structure;
- (c) sealing at joints.

## SECTION 14

### STEELWORK

#### STEELWORK

- Units** 14.01 The units of measurement shall be :
- (i) fabrication of steelwork, permanent erection of steelwork .....tonne.
  - (ii) trial erection of steelwork at place of fabrication .....item.
- Measurement** 14.02 The measurement shall be the total weight of the finished member comprising plates, rolled sections, shear connectors, stiffeners, cleats, packs, splice plates and all fittings computed in accordance with the relevant British Standard, with no allowance for tolerances for rolling margins and other permissible deviations from standard weights, and excluding the weights of weld fillets, bolts, nuts and washers, rivet heads, and protective coatings. No deduction shall be made for splays, notches, holes and the like each not exceeding 0.10 square metres.
- 14.03 The weight of steel involved in the trial erection shall be stated in the description.
- Itemisation** 14.04 Separate items shall be provided for steelwork in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Fabrication of steelwork.</li> <li>2. Erection of steelwork.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Main members.</li> <li>2. Subsidiary members.</li> <li>3. Other members.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Rolled sections.</li> <li>2. Plates.</li> <li>3. Hollow sections.</li> <li>4. Composite sections.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Different grades of steel.</li> </ul>

Group	Feature
V	1. Trial erection at place of fabrication.

<b><i>Fabrication of steelwork</i></b>	14.05	The items for the fabrication of steelwork shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) preparation of detailed fabrication drawings;</li> <li>(b) examining and checking steel for segregation, laminations, cracks and surface flaws, and carrying out any remedial measures required by the Engineer in respect of such defects;</li> <li>(c) cutting, marking off, drilling, notching, machining, form fitting, edge preparation and cambering;</li> <li>(d) welding, riveting, bolting and assembling by any process, including pre-heating and taking necessary measures to counteract shrinkage or distortion due to welding, gouging, thermal cutting or heat treatment;</li> <li>(e) rivets, bolts, nuts and washers required to fabricate the steelwork and to complete the erection and installation of steelwork on Site, together with all spares and service bolts, drifts, draw-up cleats and the like;</li> <li>(f) welding any shear connectors to steel members either at the place of fabrication or on Site, including any preheating;</li> <li>(g) routine production tests of welding during fabrication and welding records;</li> <li>(h) marking for erection, handling and protection from damage, and transportation to Site in any matching sequence required to suit the erection programme;</li> <li>(i) descaling and wire brushing parts of steelwork to be encased in or in contact with concrete;</li> <li>(j) qualification tests for welders;</li> <li>(k) procedure trials for welding, flame cutting and shearing.</li> </ul>
<b><i>Erection of steelwork</i></b>	14.06	The items for erection of steelwork shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) lifting steelwork, complete with any concrete cast on, erection and fixing in the final position in the Works, including the provision of all temporary supports and fastenings, and grouting as required;</li> <li>(b) aligning and plumbing steelwork, adjusting levels and providing temporary bracings or stays to prevent displacement, including the provision and removal of temporary attachments;</li> <li>(c) permanent welded, riveted and bolted connections required on Site, including preheating and the provision of shelters for welding;</li> <li>(d) routine production tests of welding during erection;</li> <li>(e) qualification tests for welders;</li> <li>(f) procedure trials for welding, flame cutting and shearing.</li> </ul>
<b><i>Trial erection</i></b>	14.07	The items for whole or partial trial erection at the place of fabrication shall, in accordance with General Preambles paragraph 2, include for :



**Item coverage**

- (a) lifting, erection and fixing in position in any specified sequence, including the provision of all temporary supports;
- (b) aligning and plumbing steelwork, adjusting levels and providing temporary bracings and stays to prevent displacement, including the provision and removal of temporary attachments;
- (c) provide attendance for the Engineer in proving dimensions, cambers and profiles;
- (d) match-marking members as required for final erection;
- (e) dismantling;
- (f) modifications and refitting of members as a result of the trial erection.

**CORRUGATED STEEL STRUCTURES**

**Note**

14.08 The following paragraphs are only to be used for the measurement of corrugated steel underpasses, culverts and the like.

**Units**

14.09 The unit of measurement shall be :

- (i) corrugated steel structures (stating the length) .....number.

14.10 The length stated shall be the extreme length of the corrugated steel structure.

**Itemisation**

14.11 Separate items shall be provided for corrugated steel structures in accordance with General Principles paragraphs 3 and 4 and the following:

Group	Feature
I	1. Corrugated steel structures.
II	1. Different types.
III	1. Different sizes.
IV	1. Different thicknesses.

**Corrugated steel structures**

14.12 The items for corrugated steel structures shall, in accordance with the General Preambles Paragraph 2, include for :

**Item coverage**

- (a) preparation and supply of detailed working drawings;

- (b) cutting, marking off, drilling, notching, bevels, skews, bends, edge preparation, cambering, riveting, bolting and fabricating;
- (c) laps, rivets, bolts, nuts, washers and the like, required to assemble the structure and complete the erection and installation of the corrugated structure on Site, together with spares and service bolts, drifts, draw up cleats and the like;
- (d) protective treatment;
- (e) marking members for identification and delivery in matching sequence;
- (f) channels, including casting in to line and level.

## PROTECTION OF STEELWORK

- Units** 14.13 The units of measurement shall be :
- (i) protective systems .....square metre.
  - (ii) desiccants, vapour phase inhibitors .....kilogram.
- Measurement** 14.14 The measurement shall be the surface area to be treated and the weight of desiccant or inhibitor required.
- Itemisation** 14.15 Separate items shall be provided for protection of steelwork in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Protective systems.</li> <li>2. Desiccants.</li> <li>3. Vapour phase inhibitors.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> </ul>

- Protective systems** 14.16 The items for protective systems shall, in accordance with the General Preambles paragraph 2, include for :

- Item coverage**
- (a) specimen panels;
  - (b) paint application procedure trials;
  - (c) masking and other measures to protect adjacent steelwork;
  - (d) joint fillers and sealing of bolted joints;
  - (e) cleaning and preparation of surfaces;
  - (f) complying with any special requirements in respect of ambient conditions for the application of protective treatment and for intervals between successive operations and applications;
  - (g) stripe coats.

- Desiccants and vapour phase inhibitors** 14.17 The items for desiccants and vapour phase inhibitors shall, in accordance with the General Preambles paragraph 2, include for :

- Item coverage**
- (a) placing the desiccants or inhibitors in containers in position;

- (b) taking precautions to prevent its exposure to atmosphere other than in its working environment.



## SECTION 15

### WATERPROOFING

#### WATERPROOFING

<b>Units</b>	15.01	The unit of measurement shall be :  (i) waterproofing, protection to waterproofing .....square metre.
<b>Measurement</b>	15.02	The measurement shall be the area of the surface covered. No deduction shall be made for openings each not exceeding one square metre.
<b>Itemisation</b>	15.03	Separate items shall be provided for waterproofing in accordance with General Principles paragraphs 3 and 4 and the following :
<hr/>		
	Group	Feature
<hr/>		
	I	1. Different types of waterproofing. 2. Different types of protection to waterproofing.
<hr/>		
	II	1. Horizontal surfaces and inclined surfaces sloping at 45° or less to the horizontal. 2. Vertical surfaces and surfaces sloping at more than 45° to the horizontal. 3. Domed surfaces.
<hr/>		
<b>Waterproofing</b>	15.04	The items for waterproofing shall, in accordance with General Preambles paragraph 2, include for :
<b>Item coverage</b>		(a) preparation, cleaning and drying surfaces, including levelling courses; (b) priming including protecting primed surfaces, adhesive coats, undercoats and all intermediate coats; (c) laying to cambers and falls; (d) forming nibs, angle fillets, drips, chases, external angles, mitres, stops, flashings and the like; (e) forming joints and overlaps; (f) sealing at edges and around interruptions and projections; (g) temporary protection measures and subsequent removal; (h) temporary measures to provide for drainage of surface water; (i) curved work.

***Protection to  
waterproofing***

15.05 The items for protection to waterproofing shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) surface preparation;
- (b) adhesive coats;
- (c) laying to cambers and falls;
- (d) forming or cutting to ribs, angle fillets, external angles, mitres and the like;
- (e) joints and overlaps;
- (f) formwork;
- (g) bedding and jointing tiles or bricks, including cutting;
- (h) curing and protection;
- (i) curved work.

## SECTION 16

### BEARINGS AND MOVEMENT JOINTS

#### BEARINGS

- Units** 16.01 The unit of measurement shall be :
- (i) supply of bearings, installation of bearings .....number.
- Itemisation** 16.02 Separate items shall be provided for bearings in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | 1. Supply of bearings.<br>2. Installation of bearings. |
| II    | 1. Different types.                                    |
| III   | 1. Different sizes.                                    |
- Supply of bearings** 16.03 The items for supply of bearings shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) nuts, bolts, washers, dowels, protective caps, dust covers, sockets, sleeves, wrapping, adhesives and lubricants;
- (b) corrosion protection of metal components and greasing at place of manufacture;
- (c) marking bearings for identification purposes.
- Installation of bearings** 16.04 The items for installation of bearings shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) drilling holes or forming pockets in the structure and casting in bolts, dowels, sockets and the like;
- (b) temporary supports and stays to retain bearings in position during construction;
- (c) forming plinths, including formwork;
- (d) setting and releasing locking mechanism;
- (e) adhesives and epoxy mortar, cement mortar and grout;
- (f) painting and greasing.

#### FABRICATED MOVEMENT JOINTS

- Units** 16.05 The unit of measurement shall be :
- (i) supply of fabricated movement joints, installation of fabricated movement joints .....number.

- Itemisation** 16.06 Separate items shall be provided for fabricated movement joints in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Supply of fabricated movement joints. 2. Installation of fabricated movement joints.
II	1. Different movement ranges.
III	1. Different types or materials.
IV	1. Different lengths.

- Supply of fabricated movement joints** 16.07 The items for the supply of fabricated movement joints shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) special fittings, anchorages, lugs, nuts, bolts and the like;  
 (b) corrosion protection of metal components and greasing at place of manufacture;  
 (c) marking fabricated joints for identification.

- Installation of fabricated movement joints** 16.08 The items for the installation of fabricated movement joints shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) preparation and cleaning of surfaces;  
 (b) templates, guides and temporary devices;  
 (c) setting the joint;  
 (d) protective or other treatment and greasing, including surface preparation;  
 (e) forming or cutting sealing grooves in pavements above joints or in facework, including sealing;  
 (f) bedding mortars, grouting materials, filling materials, sealants, nosings and the like, including grouting in holding-down bolts, priming surfaces and grinding down holding-down bolts;  
 (g) temporary protection measures and subsequent removal;
- (h) treating surfaces of joint exposed at finished road level to prevent skidding;  
 (i) making good gap between joint and adjoining road surface or



nosing.

## MOVEMENT JOINTS FORMED IN-SITU

- Units** 16.09 The units of measurement shall be :
- (i) joint filler .....square metre.
  - (ii) joint sealant, compression seal, bearing strip, waterbar, waterstop .....linear metre.
  - (iii) dowels .....number.
- Measurement** 16.10 The measurement of joint filler shall be the specified area of the surface covered.
- 16.11 The measurement of joint sealant shall be the length of the sealant on the external face.
- 16.12 The measurement of waterbar, compression seal, bearing strip or waterstop shall be the length along its axis.
- Itemisation** 16.13 Separate items shall be provided for movement joints formed in-situ in accordance with General Principles paragraphs 3 and 4 and the following :
- 
- | Group | Feature   |
|-------|---|
| I     | <ul style="list-style-type: none"> <li>1. Joint filler.</li> <li>2. Joint sealant.</li> <li>3. Compression seal.</li> <li>4. Bearing strip.</li> <li>5. Waterbar.</li> <li>6. Waterstop.</li> <li>7. Dowels.</li> </ul> |
| II    | <ul style="list-style-type: none"> <li>1. Different types of materials.</li> </ul>  |
| III   | <ul style="list-style-type: none"> <li>1. Different sizes.</li> <li>2. Different thicknesses.</li> </ul>  |
- 
- Joint filler** 16.14 The items for joint filler shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage** (a) cutting and shaping;  
(b) preparation and cleaning of surfaces;  
(c) adhesives or other special materials.
- Joint sealant** 16.15 The items for joint sealant shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) preparation and cleaning of surfaces;  
(b) forming or cutting sealing grooves;  
(c) priming the surface of the joint;  
(d) bond breaker tape or PVC capping strip;  
(e) temporary sealing strip or cover and removal;  
(f) protection of adjoining concrete surfaces and subsequent removal;  
(g) in the case where the joint sealant is not required to extend to the bottom of the groove, caulking.
- Compression seal** 16.16 The items for compression seal shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) preparation and cleaning of surfaces;  
(b) priming the surfaces of the joint;  
(c) adhesive or other special materials.
- Bearing strip** 16.17 The items for bearing strip shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) cutting and shaping;  
(b) preparation and cleaning of surfaces;  
(c) adhesives or other special materials.
- Waterbar and waterstop** 16.18 The items for waterbar and waterstop shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) fittings;  
(b) cutting, notching, welding and jointing;  
(c) protection of exposed waterstops.
- Dowels** 16.19 The items for dowels shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage** (a) drilling holes or forming pockets, casting in and grouting;  
(b) caps, sleeves, wrappings and coatings.

## SECTION 17

### MARINE WORKS

**Note** 17.01 Marine structures and submarine outfalls shall be measured in accordance with the units of measurement, measurements and itemisation set out in the relevant Sections for Earthworks, Drainage and Ducts, Pipework, Formwork, Steel Reinforcement, Concrete and the like.

### DREDGING

**Units** 17.02 The unit of measurement shall be :

(i) dredging, redredging surcharge material .....cubic metre.

**Measurement** 17.03 The measurement of dredging shall be the volume of the void formed by the removal of materials to the dredging profile as defined in the Contract.

**Itemisation** 17.04 Separate items shall be provided for dredging in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Dredging. 2. Redredging surcharge material.
II	1. Material other than rock or artificial hard material. 2. Rock, blasting permitted. 3. Rock, blasting not permitted. 4. Artificial hard material, blasting permitted. 5. Artificial hard material, blasting not permitted.

**Dredging** 17.05 The items for dredging shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

(a) carrying out initial and final surveys;  
 (b) marking the site with flags, marker buoys and lights;  
 (c) provision, maintenance and removal of temporary tide gauges;  
 (d) in the case of rock or artificial hard material, breaking up, getting out, loading into transport and depositing in the approved dumping ground;  
 (e) trimming to dredging profiles;  
 (f) multiple handling of dredging material;

(g) restrictions on working necessitated by existing structures;

- (h) use of divers;
- (i) removing any siltage deposited prior to filling;
- (j) dredging outside the dredging profile;
- (k) in the case of blasting being permitted, blasting trials, measurement and recording of vibrations and supplying a copy of the records to the Engineer, checking and adjusting accuracy of seismographs, preparatory work for blasting, notifying the Engineer when explosives are to be brought onto Site, screens and other protective covers, drilling shot holes, charging, stemming and blasting.

**FILL FOR MARINE STRUCTURES AND RECLAMATION**

- Note** 17.06 Fill to reclamation shall be that fill material deposited below +2.50 metres P.D. Filling above +2.50 metres P.D. shall be measured under the Earthworks Section.
- Units** 17.07 The unit of measurement shall be :
- (i) fill .....cubic metre.
- Measurement** 17.08 The measurement of fill shall be the volume of the fill formed within the fill profiles as defined in the Contract.
- Itemisation** 17.09 Separate items shall be provided for fill for marine structures and reclamation in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Underwater fill material.</li> <li>2. Rock fill material.</li> <li>3. Other stated types of fill material.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Material of different types.</li> <li>2. Material of different grades.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. From excavation on Site.</li> <li>2. Provided by the Contractor.</li> <li>3. Provided by others.</li> <li>4. Provided and placed by others.</li> <li>5. Provided by others and collected by the Contractor.</li> </ol>

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Group	Feature
IV	1. Different sources or points of collection.
V	1. In seawall foundations. 2. In breakwaters. 3. In other stated marine structures. 4. In reclamation.

***Fill for marine structures and reclamation***

17.10 The items for fill for marine structures and reclamation shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) carrying out initial and final surveys;
- (b) marking the site with flags, marker buoys and lights;
- (c) provision, maintenance and removal of temporary tide gauges;
- (d) stockpiling, multiple handling, transporting, depositing, tamping, compacting, trimming and shaping to specified profiles;
- (e) selection, separation and processing of materials;
- (f) complying with any requirements on the rate, sequence and method of deposition;
- (g) additional material lost by settlement of or penetration into the underlying material;
- (h) consolidation of fill material;
- (i) removing and disposing of any unsuitable overburden materials or material deposited by siltage prior to filling subsequent layers;
- (j) taking precautions to avoid damage to structures and existing utilities;
- (k) packing around utilities, piles and pedestals, and adjacent to or above structures;
- (l) use of divers;
- (m) filling of any void caused by overdredging or any other fill outside the fill profile.

## **ROCK ARMOUR**

***Units***

17.11 The unit of measurement shall be :

- (i) rock armour .....cubic metre.

***Itemisation***

17.12 Separate items shall be provided for rock armour in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Rock armour.
II	1. Different types.
III	1. In breakwaters. 2. In revetments. 3. In other stated marine structures.

<b>Rock armour</b>	17.13	The items for rock armour shall, in accordance with General Preambles paragraph 2, include for :
<b>Item coverage</b>		<ul style="list-style-type: none"> <li>(a) carrying out initial and final surveys;</li> <li>(b) marking the Site with flags, marker buoys and lights;</li> <li>(c) provision, maintenance and removal of temporary tide gauges;</li> <li>(d) stockpiling, multiple handling, transporting and placing rock armour;</li> <li>(e) selection, separation and processing of materials;</li> <li>(f) complying with any requirements on the rate, sequence and method of placing;</li> <li>(g) additional material lost by settlement of, or penetration into, the underlying materials;</li> <li>(h) taking precautions to avoid damage to structures and existing utilities;</li> <li>(i) packing around utilities, piles and pedestals, and adjacent to or above structures;</li> <li>(j) use of divers;</li> <li>(k) filling of any void caused by overdredging or any other fill outside the fill profile.</li> </ul>

## LEVELLING COURSE

<b>Units</b>	17.14	The unit of measurement shall be : <ul style="list-style-type: none"> <li>(i) levelling course .....square metre.</li> </ul>
<b>Measurement</b>	17.15	The measurement of levelling course shall be the plan area of the levelling course as shown on the Drawings.
<b>Itemisation</b>	17.16	Separate items shall be provided for levelling course in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
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I	1. Levelling courses of different thicknesses.
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**Levelling course** 17.17 The items for levelling course shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) setting and levelling of guide rails;
- (b) depositing, laying and trimming;
- (c) use of divers.

### **BERMSTONES**

**Units** 17.18 The unit of measurement shall be :

(i) bermstones .....square metre.

**Measurement** 17.19 The measurement of bermstones shall be the plan area of the bermstones as shown on the Drawings.

**Itemisation** 17.20 Separate items shall be provided for bermstones in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
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I	1. Bermstones of different sizes.
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**Bermstones** 17.21 The items for bermstones shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) carrying out initial and final surveys;
- (b) marking the site with flags, marker buoys and lights;
- (c) provision, maintenance and removal of temporary tide gauges;
- (d) stockpiling, multiple handling, transporting, setting and trimming;
- (e) selection, separation and processing of materials;
- (f) complying with any requirements on the rate, sequence and method of placing;
- (g) allowing for settlement and displacement of underlying material;
- (h) filling the cavities beneath and between bermstones;
- (i) taking precautions to avoid damage to structures and existing utilities;

(j) packing around utilities, piles and pedestals, and adjacent to or

- (k) above structures;  
use of divers.

**FENDERING**

- Units** 17.22 The units of measurement shall be :
- (i) timber fendering .....cubic metre.
  - (ii) rubber fendering, other stated types of fenderin.....number.
- Measurement** 17.23 The measurement of timber fendering shall be the total volume of timber as shown on the Drawings with no deduction made for bolt holes, notches and the like.
- 17.24 The measurement for rubber or other stated types of fendering shall be of the complete fender as shown on the Drawings.
- Itemisation** 17.25 Separate items shall be provided for fendering in accordance with General Principles paragraphs 3 and 4 and the following :
- 
- | Group | Feature   |
|-------|---|
| I     | 1. Timber fendering.<br>2. Rubber fendering.<br>3. Other stated types of fendering. |
| II    | 1. Different types.   |
- 
- Fendering** 17.26 The items for fendering shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) drilling, shaping, jointing, notching, chamfering and the like;
  - (b) recessing and checking;
  - (c) fittings, bolts, nuts, washers, spikes, cleats, plates, chains and angles and the like;
  - (d) protective treatment, and painting to timber and steelwork;
  - (e) staggering of all joints in walings;
  - (f) packing pieces;
  - (g) curved work;
  - (h) filling of recesses for bolt heads and the like;
  - (i) use of divers.



## MARINE FITTINGS

- Units** 17.27 The unit of measurement shall be :
- (i) mooring eyes, bollards, tide gauges, other stated marine fittings .....number.
- Measurement** 17.28 The measurement of marine fittings shall be for the complete fitting as shown on the Drawings.
- Itemisation** 17.29 Separate items shall be provided for marine fittings in accordance with General Principles paragraphs 3 and 4 and the following :
- 
- | Group | Feature   |
|-------|---|
| I     | 1. Mooring eyes.<br>2. Bollards.<br>3. Tide gauges.<br>4. Other stated marine fittings. |
| II    | 1. Different types.   |
| III   | 1. Different sizes.   |
- 
- Marine fittings** 17.30 The items for marine fittings shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) casting into structure;  
 (b) fixings, jointing and welding;  
 (c) protective treatment and painting;  
 (d) setting tide gauges to level;  
 (e) reinstating;  
 (f) use of divers;  
 (g) in the case of bollards, reinforcement, concrete plinth, filling metal collar with concrete, drilling in concrete and grouting.



## SECTION 18

### TUNNELLING

- Notes**
- 18.01 Tunnels constructed by cut and cover methods shall be measured in accordance with the units of measurement, measurements and itemisation set out in the relevant Sections for Earthworks, Formwork, Steel Reinforcement, Concrete and the like.
- 18.02 Notwithstanding clause 18.11(h) temporary support may be measured but only to the extent stated in the Contract.

### SPECIAL PRELIMINARIES

- Units**
- 18.03 The unit of measurement shall be :
- (i) temporary ventilation, temporary lighting, tunnelling equipment .....item.
- Itemisation**
- 18.04 Separate items shall be provided for special preliminaries in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	1. Temporary ventilation. 2. Temporary lighting. 3. Tunnelling equipment.

---

- Temporary ventilation**
- 18.05 The items for temporary ventilation shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) fans and ducts;  
 (b) charges for power;  
 (c) temporary ventilation shafts and tunnels including reinstatement;  
 (d) maintenance and removal.
- Temporary lighting**
- 18.06 The items for temporary lighting shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) charges for power;  
 (b) maintenance and removal.

- Tunnelling**
- 18.07 The items for tunnelling equipment shall, in accordance with General Preambles

*equipment* paragraph 2, include for :

- Item coverage*
- (a) all equipment necessary to complete the tunnel excavation;
  - (b) maintenance and removal.

**EXCAVATION**

*Units* 18.08 The units of measurement shall be :

- (i) excavation in tunnel, excavation in shaft .....linear metre.
- (ii) excavation for passing place, excavation for other stated chambers .....cubic metre.

*Measurement* 18.09 The measurement of excavation in tunnel and excavation in shaft shall be the length of the lining of a particular type as shown on the Drawings or ordered by the Engineer.

*Itemisation* 18.10 Separate items shall be provided for excavation in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Excavation for different types of lining.
II	<ul style="list-style-type: none"> <li>1. In tunnel.</li> <li>2. In shaft.</li> <li>3. For passing place.</li> <li>4. For other stated chamber.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Straight.</li> <li>2. Curved.</li> </ul>

*Excavation* 18.11 The items for excavation shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage*
- (a) excavation in all materials;
  - (b) multiple handling of excavated material;
  - (c) the use of material for the protection of the sub-grade and its subsequent removal;
  - (d) selection and separation of materials;
  - (e) breaking down material necessary to comply with the requirements of fill;
  - (f) overbreak and excavation for working space;
  - (g) drainage and dealing with inflow of water;
  
  - (h) temporary support to tunnel excavation;
  - (i) disposal of surplus excavated material;

- (j) scaling and washing down excavated surfaces;
- (k) probing ahead or radially;
- (l) formation, maintenance and reinstatement of temporary access tunnels and shafts;
- (m) preparation and submission of records to the Engineer;
- (n) filling to overbreak and working space;
- (o) chainage and level marks.

**IN-SITU CONCRETE LINING**

- Units** 18.12 The units of measurement shall be :
- (i) in-situ concrete lining to tunnel, in-situ concrete lining to shaft .....linear metre.
  - (ii) in-situ concrete lining to passing place, in-situ concrete lining to other stated chamber .....cubic metre.

- Measurement** 18.13 The measurement of the in-situ concrete lining shall be the length along its axis. At junctions, measurement shall terminate at the external face of the lining to the adjoining tunnel or shaft.
- 18.14 The measurement of in-situ concrete lining to passing place and other stated chamber shall be the difference between the volume of the concrete lining at the passing place or other stated chamber indicated on the Drawings and the volume of the regular in-situ concrete lining as indicated on the Drawings.

- Itemisation** 18.15 Separate items, shall be provided for in-situ concrete linings in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. In-situ concrete lining.
II	1. Different types.
III	1. Different grades of concrete.

Group                      Feature

- 
- |    |  |
|----|--|
| IV | <ol style="list-style-type: none"> <li>1. In tunnel.</li> <li>2. In shaft.</li> <li>3. In passing place.</li> <li>4. In other stated chamber.</li> </ol> |
|----|--|
- 

- |   |  |
|---|--|
| V | <ol style="list-style-type: none"> <li>1. Straight.</li> <li>2. Curved.</li> </ol> |
|---|--|
- 

***In-situ concrete lining***

18.16 The items for in-situ concrete lining shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) trial mixes;
- (b) mixing, placing, compaction and finishes;
- (c) curing and protection;
- (d) weep pipes, grout pipes, pipe sleeves and the like;
- (e) construction joints (whether shown or not on the Drawings) including formwork, waterbars and waterstops;
- (f) holes, ducts, pockets, sockets, mortices and the like;
- (g) surface preparation of excavated surfaces;
- (h) waterproofing and membranes;
- (i) formwork;
- (j) reinforcement;
- (k) drainage pipes and filter layers;
- (l) additives;
- (m) cavity grouting;
- (n) chainage and level marks.

## **PREFORMED SEGMENTAL LINING**

***Units***

18.17 The unit of measurement shall be :

- (i) preformed segmental lining .....linear metre.

***Measurement***

18.18 The measurement of the preformed segmental lining shall be the length along its axis. At junctions measurement shall terminate at the external face of the lining to the adjoining tunnel or shaft.

***Itemisation***

18.19 Separate items shall be provided for preformed segmental linings in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Precast reinforced concrete segmental lining.</li> <li>2. Steel segmental lining.</li> <li>3. Cast iron segmental lining.</li> <li>4. Ductile iron segmental lining.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types or sizes.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. In tunnel.</li> <li>2. In shaft.</li> </ol>
IV	<ol style="list-style-type: none"> <li>1. Straight.</li> <li>2. Curved.</li> </ol>

***Preformed  
segmental lining***

18.20 The items for preformed segmental lining shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) trial mixes and trial assemblies;
- (b) formwork;
- (c) reinforcement;
- (d) waterproofing membranes;
- (e) surface finish and curing;
- (f) fillets, chambers, splays, rebates, recesses, grooves and the like;
- (g) forming holes, ducts, pockets, sockets and the like;
- (h) dowels, bolts, nuts and grummetts;
- (i) joint seals and caulking;
- (j) drainage pipes and filter layers;
- (k) cavity grouting;
- (l) surface protection;
- (m) chainage and level marks.

## **STEEL TUNNEL LINING**

***Units***

18.21 The unit of measurement shall be :

- (i) steel tunnel lining .....linear metre.

***Measurement***

18.22 The measurement of the steel tunnel lining shall be the length measured along its axis. At junctions measurement shall terminate at the external face of the lining to the adjoining tunnel or shaft.

**Itemisation** 18.23 Separate items shall be provided for steel tunnel lining in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Different thicknesses of steel lining.
II	1. Different diameters.
III	1. Different grades of steel.
IV	1. In tunnel. 2. In shaft.
V	1. Straight. 2. Curved.

**Steel tunnel lining**

18.24 The items for steel tunnel lining shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) cutting and jointing;
- (b) internal and external protection;
- (c) chainage and level marks;
- (d) internal lining to steel.

## CONCRETE SURROUND TO STEEL TUNNEL LINING

**Units**

18.25 The unit of measurement shall be :

- (i) concrete surround to steel tunnel lining .....linear metre.

**Measurement**

18.26 The measurement of concrete surround to steel tunnel lining shall be the length of steel lining surround measured along the axis of the steel lining. At junctions, measurement shall terminate at the external face of the adjoining tunnel lining.

**Itemisation**

18.27 Separate items shall be provided for concrete surround to steel tunnel lining in accordance with General Principles paragraphs 3 and 4 and the following :



Group	Feature
I	1. Different grades of concrete surround.
II	1. To different diameters of steel lining.
III	1. In tunnel. 2. In shaft.
IV	1. Straight. 2. Curved.

**Concrete  
surround to steel  
tunnel lining**

18.28 The items for concrete surround to steel tunnel lining shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) trial mixes;
- (b) mixing, placing, compaction and finishes;
- (c) curing and protection;
- (d) weep pipes, grout pipes, pipe sleeves and the like;
- (e) construction joints (whether shown or not on the Drawings) including formwork, waterbars and waterstops;
- (f) holes, ducts, pockets, sockets, mortices and the like;
- (g) surface preparation of excavated surfaces;
- (h) waterproofing and membranes;
- (i) formwork;
- (j) reinforcement;
- (k) drainage pipes and filter layers;
- (l) additives;
- (m) cavity grouting;
- (n) chainage and level marks;
- (o) drilling or forming grout holes;
- (p) forming and welding grout hole plugs.

## SPRAYED CONCRETE

**Units**

18.29 The unit of measurement shall be :

- (i) sprayed concrete .....square metre.

**Measurement**

18.30 Sprayed concrete shall only be measured for each individual layer of specified thickness applied on the Engineer's instruction and not forming part of a tunnel lining measured under another item.

18.31 The measurement for sprayed concrete shall be the surface area of the face to be covered. No allowance shall be made for surface irregularities or other local peculiarities.

**Itemisation**

18.32 Separate items shall be provided for sprayed concrete in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Different grades of sprayed concrete.
II	1. Different thicknesses of layers.
III	1. With steel fibres of different dosages. 2. With fabric reinforcement of different B.S. references.
IV	1. To tunnel. 2. To shaft. 3. To passing place. 4. To other stated chamber.

**Sprayed concrete**

18.33 The items for sprayed concrete shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) preliminary mix trials;
- (b) test specimens and test panels;
- (c) preparation of surfaces to receive sprayed concrete;
- (d) reinforcement and anchor bars;
- (e) additives;
- (f) formwork;
- (g) weepholes and filter materials;
- (h) finishing and curing.

**ROCK BOLTS**

**Units**

18.34 The unit of measurement shall be :

- (i) rock bolts .....number.

**Measurement**

18.35 Rock bolts shall only be measured if ordered by the Engineer and if they do not form part of a tunnel lining measured under another item.

**Itemisation** 18.36 Separate items shall be provided for rock bolts in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Rock bolts of different diameters.
II	1. Different lengths.
III	1. Different types.

**Rock bolts** 18.37 The items for rock bolts shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) drilling and washing out bolt holes;
  - (b) anchorages;
  - (c) grouting rock bolts;
  - (d) tensioning rock bolts;
  - (e) checking and re-tensioning rock bolts;
  - (f) recording and supplying records to the Engineer.

### STEEL ARCH RIBS AND INVERT STRUTS

**Units** 18.38 The unit of measurement shall be :

- (i) steel arch ribs, invert struts .....tonne.

**Measurement** 18.39 Steel arch ribs and invert struts shall be measured if ordered by the Engineer and if they do not form part of a tunnel lining measured separately under another item.

18.40 The measurement of steel arch ribs and invert struts shall be the total weight of the rib or strut excluding the weights of base plates, bolts, nuts, washers, spacer bars and the like. No deduction shall be made for bolt holes.

**Itemisation** 18.41 Separate items shall be provided for steel arch ribs and invert struts in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
-------	---------

---

- |   |  |
|---|--|
| I | <ol style="list-style-type: none"> <li>1. Different types of steel arch ribs.</li> <li>2. Different types of invert struts.</li> </ol> |
|---|--|
- 

- |    |   |
|----|---|
| II | <ol style="list-style-type: none"> <li>1. Different grades of steel.</li> </ol> |
|----|---|
- 

***Steel arch ribs  
and invert struts***

18.42 The items for steel arch ribs and invert struts shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) base plates, bolts, nuts, washers, spacer bars and the like;
- (b) packing, blocking and wedging;
- (c) lagging;
- (d) additional excavation to accommodate the arch, including disposal of excavated material and backfilling;
- (e) protective treatment.

## **JUNCTIONS**

***Units***

18.43 The unit of measurement shall be :

- (i) junctions .....number.

***Itemisation***

18.44 Separate items shall be provided for junctions in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
-------	---------

---

- |   |   |
|---|---|
| I | <ol style="list-style-type: none"> <li>1. Junctions.</li> </ol> |
|---|---|
- 

- |    |   |
|----|---|
| II | <ol style="list-style-type: none"> <li>1. Between tunnels with linings of stated types.</li> <li>2. Between tunnel with lining of stated type and shaft with lining of stated type.</li> <li>3. Between different stated types of linings.</li> </ol> |
|----|---|
-

- Junctions** 18.45 The items for junctions shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) excavation;
  - (b) in-situ concrete lining;
  - (c) preformed segmental lining;
  - (d) steel lining;
  - (e) concrete surround to steel lining.

**PROBING AHEAD**

- Units** 18.46 The unit of measurement shall be :
- (i) probing ahead .....linear metre.
- Measurement** 18.47 Probing ahead shall only be measured if ordered by the Engineer. The measurement shall be for each individual probe or hole.
- Itemisation** 18.48 Separate items shall be provided for probing ahead in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Probing ahead.
II	1. In rock or artificial hard material. 2. In material other than rock or artificial hard material.

- Probing ahead** 18.49 The items for probing ahead shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) standing costs of tunnelling plant and labour during probing operation;
  - (b) taking readings, measurements and observations, recording and supplying records to the Engineer.



## SECTION 19

### GEOTECHNICAL WORKS

- Note* 19.01 Buttresses shall be measured in accordance with the units of measurement, measurements and itemisation set out in the relevant Sections for Earthworks, Formwork, Steel Reinforcement, Concrete and the like.

### SLOPE INSPECTION

- Units* 19.02 The unit of measurement shall be :
- (i) inspection scaffolding, clearance of vegetation and soil stripping .....square metre.

- Measurement* 19.03 The measurement of inspection scaffolding shall be the area of the face to be covered by the scaffolding. No allowance shall be made for surface irregularities or other local peculiarities.

- 19.04 The measurement of clearance of vegetation and soil stripping shall be the surface area of the area or face cleared. No allowance shall be made for surface irregularities or other local peculiarities.

- Itemisation* 19.05 Separate items shall be provided for slope inspection in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Inspection scaffolding. 2. Clearance of vegetation and soil stripping.
II	1. Different locations.

- Inspection scaffolding* 19.06 The items for inspection scaffolding shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage*
- (a) provision, maintenance and subsequent removal;  
 (b) safety ropes and harnesses;  
 (c) platforms, ramps, protection fences and barriers.

**Clearance of vegetation, etc.**

19.07 The items for clearance of vegetation and soil stripping shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) removal of vegetation not measured as site clearance;
- (b) excavation and disposal of topsoil and existing impermeable surfaces;
- (c) temporary protection of stripped area;
- (d) reinstatement of slope;
- (e) taking readings, measurements and observations, recording and supplying records to the Engineer.

**ROCK SCALING, REMOVING BOULDERS, SEALING AND INFILLING ROCK JOINTS, AND MESH PROTECTION**

**Units**

19.08 The units of measurement shall be :

- (i) rock scaling, mesh protection .....square metre.
- (ii) removing boulders .....cubic metre.
- (iii) sealing rock joints, infilling rock joints .....cubic metre.

**Measurement**

19.09 The measurement of rock scaling shall be the surface area of the face to be scaled. No allowance shall be made for surface irregularities or other local peculiarities.

19.10 The measurement of mesh protection shall be the surface area of the face to be protected. No allowance shall be made for surface irregularities or other local peculiarities. No deduction shall be made for openings each not exceeding one square metre.

19.11 Removing boulders shall only be measured if ordered by the Engineer.

**Itemisation**

19.12 Separate items shall be provided for rock scaling, removing boulders, sealing and infilling rock joints, and mesh protection in accordance with General Principles paragraphs 3 and 4 and the following:

---

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Rock scaling.</li> <li>2. Removing boulders.</li> <li>3. Sealing rock joints.</li> <li>4. Infilling rock joints.</li> <li>5. Mesh protection.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types of mesh protection.</li> </ul>

---



**Rock scaling and removing boulders** 19.13 The items for rock scaling and removing boulders shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) soil cushions and subsequent removal;
  - (b) washing down;
  - (c) disposal of rock scale debris and boulders;
  - (d) temporary protective measures and subsequent removal.

**Mesh protection** 19.14 The items for mesh protection shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) preparation of surfaces;
  - (b) bolts and anchorages;
  - (c) lapping, binding and jointing;
  - (d) removing.

**Sealing and infilling rock joints** 19.15 The items for sealing and infilling rock joints shall, in accordance with General Preamble paragraph 2, include for :

- Item coverage**
- (a) clearing unsuitable infill;
  - (b) concrete and/or cement mortar;
  - (c) formwork;
  - (d) reinforcement;
  - (e) masonry infilling.

**RELIEF DRAINS**

**Units** 19.16 The unit of measurement shall be :

- (i) relief drains .....linear metre.

**Measurement** 19.17 The measurement of relief drains shall be along the centreline of the drain installed.

**Itemisation** 19.18 Separate items shall be provided for relief drains in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Relief drains.
II	1. Different sizes.
III	1. Different locations.

**Relief drains** 19.19 The items for relief drains shall, in accordance with General Preambles

paragraph 2, include for :

- (a) nails, bolts and nuts for fixing;
- (b) excavation and disposal of material from joints, faults and discontinuities;
- (c) connecting to weepholes.

## RAKING DRAINS

### *Units*

- 19.20 The units of measurement shall be :
- (i) establishment of equipment .....item.
  - (ii) moving equipment .....number.
  - (iii) drilling drain hole, raking drains .....linear metre.

### *Measurement*

- 19.21 The measurement of establishment of equipment shall be for bringing the equipment onto the Site.
- 19.22 The measurement of moving equipment shall correspond to the number of drain holes shown on the Drawings or ordered by the Engineer.
- 19.23 The measurement of drilling drain holes shall be the drilled length of the hole.
- 19.24 The measurement of raking drains shall be the length of drain installed.

### *Itemisation*

- 19.25 Separate items shall be provided for raking drains in accordance with General Principles paragraphs 3 and 4 and the following :

---

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Establishment of equipment.</li> <li>2. Moving equipment.</li> <li>3. Drilling drain hole.</li> <li>4. Raking drains.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Vertically downwards.</li> <li>2. Downwards at an angle 0° - 45° to the vertical.</li> <li>3. Horizontally or downwards at an angle less than 45° to the horizontal.</li> <li>4. Upwards at an angle 0° - 45° to the horizontal.</li> <li>5. Upwards at an angle less than 45° to the vertical.</li> </ul>

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Group	Feature
III	1. Different diameters.
IV	1. Different types of raking drains.
V	1. Drain hole length not exceeding 25.00 m. 2. Drain hole length exceeding 25.00 m but not exceeding 40.00 m and so on in steps of 15.00 m.

<b><i>Establishment of equipment</i></b>	19.26	The items for establishment of equipment shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) providing sufficient numbers of rigs together with all ancillary equipment;</li> <li>(b) removing the rigs and ancillary equipment off Site.</li> </ul>
<b><i>Moving equipment</i></b>	19.27	The items for moving equipment shall, in accordance with General Preambles paragraph 2, include for :-
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) provision, maintenance and removal of all Temporary Works required as access and working platforms;</li> <li>(b) site clearance and reinstatement;</li> <li>(c) diversion of watercourses;</li> <li>(d) setting up rigs.</li> </ul>
<b><i>Drilling drain holes</i></b>	19.28	The items for drilling drain holes shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) drilling in any material;</li> <li>(b) water, compressed air and drilling fluids;</li> <li>(c) taking soil samples and rock cores;</li> <li>(d) recording and supplying records to the Engineer;</li> <li>(e) disposal of material;</li> <li>(f) temporary sealing for holes.</li> </ul>
<b><i>Raking drains</i></b>	19.29	The items for raking drains shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) pipes, tubes, drain liners, drain screens and the like, including slots and perforations;</li> <li>(b) filter sheaths and fabric;</li> <li>(c) jointing and socketing;</li> <li>(d) bentonite plugs and mortar seals;</li> <li>(e) markings.</li> </ul>

## CAISSON DRAINS

- Units**
- 19.30 The units of measurement shall be :-
- (i) establishment of equipment .....item.
  - (ii) moving equipment .....number.
  - (iii) caisson drains .....linear metre.
  - (iv) extra over for breaking out obstructions .....cubic metre.

- Measurement**
- 19.31 The measurement of establishment of equipment shall be for bringing the equipment onto the Site.
- 19.32 The measurement of moving equipment shall be the number of caisson drains shown on the Drawings or ordered by the Engineer. Any additional moves to suit the Contractor's method of working shall not be measured.
- 19.33 The measurement of caisson drains shall be the length of the drain measured along the axis from the existing ground surface or earthworks final surface, whichever is lower, to the bottom of the excavation.
- 19.34 The measurement of extra over for breaking out obstructions shall be the volume of the voids formed by the removal of rocks, boulders, artificial hard material and the like, which can only be removed by special plant or explosives, and which is within the specified cross section of the caisson drain.

- Itemisation**
- 19.35 Separate items shall be provided for caisson drains in accordance with General Principles paragraphs 3 and 4 and the following:-

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Establishment of equipment.</li> <li>2. Moving equipment.</li> <li>3. Caisson drains.</li> <li>4. Extra over for breaking out obstructions.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Blasting permitted.</li> <li>2. Blasting not permitted.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different cross sections.</li> </ol>
IV	<ol style="list-style-type: none"> <li>1. Caisson drains not exceeding 5.00 m in length.</li> <li>2. Caisson drains exceeding 5.00 m but not exceeding 10.00 m in length and so on in steps of 5.00 m.</li> </ol>

<b><i>Establishment of equipment</i></b>	19.36	The items for establishment of equipment shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) providing sufficient numbers of rigs together with all ancillary equipment;</li> <li>(b) removing the rigs and ancillary equipment off Site.</li> </ul>
<b><i>Moving equipment</i></b>	19.37	The items for moving equipment shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) provision, maintenance and removal of all Temporary Works required as access and working platforms;</li> <li>(b) site clearance and reinstatement;</li> <li>(c) setting up equipment.</li> </ul>
<b><i>Caisson drains</i></b>	19.38	The items for caisson drains shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) determining the position of and exposing underground utilities adjacent to caissons before work commences;</li> <li>(b) taking all necessary measures to minimise the settlement of ground and adjacent structures and utilities and to prevent the formation of cavities in the ground resulting from caisson works;</li> <li>(c) monitoring the noise levels, vibration, ground movement and groundwater levels, taking records and measurements and supplying one copy to the Engineer;</li> <li>(d) excavating, including any casing or lining, removing and disposing of material excavated from the caisson;</li> <li>(e) partial or total removal of concrete lining and disposal;</li> <li>(f) ventilation and lighting;</li> <li>(g) taking all measures required due to the presence of water in the caisson;</li> <li>(h) cleaning base of excavation and removing all loose material prior to placing filter material;</li> <li>(i) taking all necessary precautions to prevent excavated material from contaminating the Site or adjacent areas or entering any drainage system or watercourse;</li> <li>(j) placing and compacting granular filter material;</li> <li>(k) backfilling with special fill material and compaction;</li> <li>(l) interconnecting and discharge pipework and pumps;</li> <li>(m) submitting construction records and record drawings;</li> <li>(n) preparing detailed face logs;</li> <li>(o) in the case of blasting being permitted, blasting trials, explosives, measurement and recording of vibrations and supplying copy of records to the Engineer, checking and adjusting accuracy of seismographs, preparatory work for blasting, notifying the Engineer when explosives are to be brought onto Site, screens and other protective covers, drilling shot holes, charging, stemming and blasting.</li> </ul>

**Extra over for breaking out obstructions** 19.39 The items for extra over for breaking out obstructions shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) provision, maintenance and removal of specialist equipment;
- (b) explosives;
- (c) overbreak and making good.

## **PREFABRICATED BAND DRAINS**

**Units** 19.40 The units of measurement shall be :

- (i) establishment of equipment .....item.
- (ii) moving equipment .....number.
- (iii) prefabricated band drains .....linear meter.

**Measurement** 19.41 The measurement of establishment of equipment shall be for bringing the equipment onto the Site.

19.42 The measurement of moving equipment shall correspond to the number of prefabricated band drains shown on the Drawings or ordered by the Engineer.

**Itemisation** 19.43 Separate items shall be provided for prefabricated band drains in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Establishment of equipment.</li> <li>2. Moving equipment.</li> <li>3. Prefabricated band drains.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Drain not exceeding 5.00 m in length.</li> <li>2. Drain exceeding 5.00 m but not exceeding 10.00 m in length and so on in steps of 5.00 m.</li> </ul>

**Establishment of equipment** 19.44 The items for establishment of equipment shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) providing sufficient numbers of rigs together with all ancillary equipment;
- (b) removing the rigs and ancillary equipment off Site.

**Moving equipment** 19.45 The items for moving equipment shall, in accordance with General Preamble paragraph 2, include for :

**Item coverage** (a) provision, maintenance and removal of all Temporary Works

- (b) required as access and working platforms;
- (b) site clearance and reinstatement;
- (c) setting up equipment.

***Prefabricated band drains***

19.46 The items for prefabricated band drains shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) installing in any material;
- (b) cutting and trimming to required level;
- (c) removing outer casing.

**GROUND TREATMENT**

***Units***

19.47 The units of measurement shall be :

- (i) establishment of drilling and grouting plant .....item.
- (ii) drilling grout hole .....linear metre.
- (iii) cement in grout, chemical in grout .....tonne.

***Measurement***

19.48 Ground treatment shall only be measured if ordered by the Engineer.

19.49 The measurement of drilling grout hole shall be the length of the hole drilled.

19.50 The measurement of cement in grout and chemical in grout shall be the dry weight of the cement or chemical in the grout solution.

***Itemisation***

19.51 Separate items shall be provided for pressure grouting in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
I	<ul style="list-style-type: none"> <li>1. Establishment of drilling and grouting plant.</li> <li>2. Drilling grout hole.</li> <li>3. Cement in grout.</li> <li>4. Silicate based chemical in grout.</li> <li>5. Other chemical in grout.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Vertically downwards.</li> <li>2. Downwards at an angle 0° - 45° to the vertical.</li> <li>3. Horizontally or downwards at an angle less than 45° to the horizontal.</li> <li>4. Upwards at an angle 0° - 45° to the horizontal.</li> <li>5. Upwards at an angle less than 45° to the vertical.</li> </ul>

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Group	Feature
III	1. In rock or artificial hard material. 2. In material other than rock or artificial hard material.
IV	1. From the surface. 2. From the tunnel.

***Establishment of drilling and grouting plant*** 19.52 The items for establishment of drilling and grouting plant shall, in accordance with the General Preambles paragraph 2, include for :

***Item coverage***

- (a) providing sufficient numbers of drilling rigs, pumps, mixers and other equipment;
- (b) provision, maintenance and removal of all Temporary Works required as access and working platforms;
- (c) site clearance and reinstatement;
- (d) diversion of watercourses;
- (e) setting up plant and other equipment, and moving between holes;
- (f) removing plant and other equipment off Site.

***Drilling grout holes*** 19.53 The items for drilling grout holes shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) determining location of underground utilities and obstructions before drilling commences, and modifying drilling pattern to take into account locations of utilities and obstructions;
- (b) water, compressed air and drilling fluids;
- (c) lining to grout holes;
- (d) redrilling holes and grouting tubes and flushing;
- (e) testing drill holes;
- (f) disposal of effluent;
- (g) reinstatement of surfaces;
- (h) drilling in any material;
- (i) temporary protection of holes and subsequent removal.

***Cement and chemicals in grout*** 19.54 The items for cement in grout and chemicals in grout shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) trial mixes and grouting trials;
- (b) mixing and injection of grout;
- (c) recording and monitoring equipment and checking accuracy of such equipment;
- (d) water;
- (e) sand;
- (f) packers;
- (g) wastage;
- (h) recording and supplying monitoring, testing and grouting records to the Engineer.

## **ROCK DOWELS**



**Units** 19.55 The unit of measurement shall be :  
 (i) rock dowels .....number.

**Itemisation** 19.56 Separate items shall be provided for rock dowels in accordance with General Principles 3 and 4 and the following :

Group	Feature
I	1. Different types of rock dowel.
II	1. Different diameters.
III	1. Different lengths.

**Rock dowels** 19.57 The items for rock dowels shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) provision, maintenance and removal of all Temporary Works required as access and working platforms;
  - (b) site clearance and reinstatement;
  - (c) drilling in any material;
  - (d) grouting;
  - (e) protective treatment;
  - (f) recording and supplying records to the Engineer.

**ROCK BOLTS AND GROUND ANCHORS**

**Units** 19.58 The units of measurement shall be :  
 (i) establishment of equipment for rock bolts, establishment of equipment for ground anchors .....item.  
 (ii) moving equipment, rock bolts, ground anchors .....number.

**Measurement** 19.59 The measurement of establishment of equipment shall be for bringing the equipment onto the Site.

19.60 The measurement of moving equipment shall correspond to the number of rock bolts and/or ground anchors shown on the Drawings or ordered by the Engineer.

**Itemisation**

19.61 Separate items shall be provided for rock bolts and ground anchors in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Establishment of equipment for rock bolts.</li> <li>2. Establishment of equipment for ground anchors.</li> <li>3. Moving equipment for rock bolts.</li> <li>4. Moving equipment for ground anchors.</li> <li>5. Rock bolts.</li> <li>6. Ground anchors.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different free lengths.</li> </ol>
IV	<ol style="list-style-type: none"> <li>1. Different working loads.</li> </ol>

**Establishment of equipment**

19.62 The items for establishment of equipment shall, in accordance with General Preambles paragraph 2, include for:

**Item coverage**

- (a) providing sufficient numbers of rigs together with all ancillary equipment;
- (b) removing the rigs and ancillary equipment off Site.

**Moving equipment**

19.63 The items for moving equipment shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) provision, maintenance and removal of all Temporary Works required as access and working platforms;
- (b) site clearance and reinstatement;
- (c) diversion of watercourses;
- (d) setting up rigs.

**Rock bolts and ground anchors**

19.64 The items for rock bolts and ground anchors shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) pull-out trials;
- (b) drilling in any material;
- (c) water, compressed air and drilling fluids;
- (d) washing out holes;
- (e) water absorption tests, pre-grouting and reaming;
- (f) grouting in rock bolts, dowels or anchors;
- (g) reinforcement, formwork and concrete;
- (h) protective treatment;
- (i) stressing, proving and re-stressing;
- (j) recording and supplying records to the Engineer.

## MONITORING OF GROUND ANCHORS

- Units** 19.65 The unit of measurement shall be :
- (i) monitoring of ground anchors .....number.
- Measurement** 19.66 The measurement of monitoring of ground anchors shall be the number of monitoring tests ordered by the Engineer.
- Itemisation** 19.67 Separate items shall be provided for monitoring of ground anchors in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature                               |
|-------|---------------------------------------|
| I     | 1. Monitoring of ground anchors.      |
| II    | 1. Different working loads of anchor. |
- Monitoring of ground anchors** 19.68 The items for monitoring of ground anchors shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) provision, maintenance and removal of all Temporary Works required as access and working platforms;
  - (b) site clearance and reinstatement;
  - (c) diversion of watercourses.

## SURFACE PROTECTION

- Units** 19.69 The unit of measurement shall be :
- (i) chunam, sprayed concrete .....square metre.
- Measurement** 19.70 Surface protection shall only be measured if ordered by the Engineer or shown on the Drawings and shall be measured as the surface area of the face to be covered. No allowance shall be made for surface irregularities or other local peculiarities.

**Itemisation**

19.71 Separate items shall be provided for surface protection in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Chunam. 2. Different grades of sprayed concrete.
II	1. Different thicknesses of layers.
III	1. With steel fabric reinforcement of different BS references. 2. With steel fibres of different dosages.

**Chunam**

19.72 The items for chunam shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) cleaning, trimming and regulating the surface to be covered;
- (b) preliminary trial panels not accepted as part of the permanent works;
- (c) dowels;
- (d) weepholes and filter materials;
- (e) finishing and curing;
- (f) removing.

**Sprayed concrete**

19.73 The items for sprayed concrete shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) preliminary mix trials;
- (b) preliminary trial panels not accepted as part of the permanent work;
- (c) test specimens and test panels;
- (d) preparation of surfaces to be covered;
- (e) relief drains;
- (f) reinforcement, fibres and anchor bars;
- (g) admixtures;
- (h) formwork;
- (i) weepholes and filter materials;
- (j) finishing and curing;
- (k) sounding, and removal and replacement of substandard or hollow areas;
- (l) recording and supplying records to the Engineer.

## GROUNDWATER CONTROL AND DRAWDOWN

- Units** 19.74 The unit of measurement shall be :
- (i) dewatering, groundwater recharge .....item.
- Measurement** 19.75 The measurement of dewatering and groundwater recharge shall be the complete installation. Dewatering and groundwater recharge shall only be measured where such operations are specially ordered by the Engineer.
- Itemisation** 19.76 Separate items shall be provided for groundwater control and drawdown in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature                                    |
|-------|--|
| I     | 1. Dewatering.<br>2. Groundwater recharge. |
| II    | 1. Different locations.                    |
- Dewatering** 19.77 The items for dewatering shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) provision, operation, maintenance and removal of all necessary plant and equipment;
- (b) obtaining necessary approvals from relevant authorities for discharging water into drainage systems, watercourses or the sea;
- (c) full-time site attendant where required;
- (d) silt-traps;
- (e) monitoring of groundwater levels and settlement, including all necessary equipment;
- (f) recording and supplying records to the Engineer.
- Groundwater recharge** 19.78 The items for groundwater recharge shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) provision, operation, maintenance and removal of all necessary plant and equipment;
- (b) full time site attendant where required;
- (c) water;
- (d) monitoring of groundwater levels, including all necessary equipment and instruments;
- (e) recording and supplying records to the Engineer.



## SECTION 20

### RAILWAY WORKS

#### BALLAST

- Units** 20.01 The unit of measurement shall be :
- (i) ballast .....cubic metre.
- Measurement** 20.02 The measurement of ballast shall be the volume measured to the outlines shown on the Drawings less the embedded volume of sleepers.
- Itemisation** 20.03 Separate items shall be provided for ballast in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature   |
|-------|---|
| I     | 1. Ballast.                                     |
| II    | 1. Permanent-way.<br>2. Existing permanent-way. |
| III   | 1. Under occupation.                            |
| IV    | 1. Under isolation.                             |
- Ballast** 20.04 The items for ballast shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- cleaning and preparing formation;
  - depositing and compacting;
  - boxing up to sleepers;
  - dressing;
  - protecting surfaces, including removing materials and rubbish, cleaning and replacing ballast;
  - ballast required due to settlement and consolidation.

**CONCRETE PAVED PERMANENT-WAY FOUNDATIONS**

**Units** 20.05 The units of measurement shall be :

- (i) concrete paved permanent-way foundations .....linear metre.
- (ii) concrete paved permanent-way foundations at turnouts and crossings and additional width at permanent-way assemblies, refuges and the like .....square metre.

**Measurement** 20.06 The measurement of concrete paved permanent-way foundations shall be the length along the centreline. The measurement of concrete paved permanent-way foundations at turnouts and crossings, and additional width at permanent-way assemblies, refuges and the like, shall be the top surface area of the foundation.

**Itemisation** 20.07 Separate items shall be provided for concrete paved permanent-way foundations in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Concrete paved permanent-way foundations.</li> <li>2. Concrete paved permanent-way foundations at turnouts and crossings, and additional width at permanent-way assemblies, refuges and the like.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Different dimensions.</li> </ul>

**Concrete paved permanent-way foundations** 20.08 The items for concrete paved permanent-way foundations shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) preliminary trial lengths not accepted as part of the permanent works;
  - (b) trial mixes;
  - (c) waterproof membrane underlay;
  - (d) longitudinal, expansion, contraction, warping and construction joints;
  - (e) formwork;
  - (f) mixing, depositing, spreading, compaction and finishing;
  - (g) reinforcement;
  - (h) surface finishing, curing and protecting;



- (i) recesses, openings and bays;
- (j) falls, cambers and shaped profiles;
- (k) side drains;
- (l) holes, ducts, pockets, sockets, mortices and the like;
- (m) casting in bolts, screws, bearing plates, lugs and the like;
- (n) additives.

### **PERMANENT-WAY, PERMANENT-WAY ASSEMBLIES AND PERMANENT-WAY ACCESSORIES**

- Units**                    20.09    The units of measurement shall be :
- (i) permanent-way .....linear metre.
  - (ii) permanent-way assemblies, permanent-way accessories .....number.
- Measurement**            20.10    The measurement of permanent-way shall be the length along the centreline of complete permanent-way (two-rail) excluding permanent-way assemblies between stock rail joints and/or crossing joints.
- 20.11    The measurement of permanent-way assemblies and permanent-way accessories shall be of the complete assembly or accessory.
- Itemisation**            20.12    Separate items shall be provided for permanent-way, permanent-way assemblies and permanent-way accessories in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Permanent-way.</li> <li>2. Permanent-way assemblies.</li> <li>3. Permanent-way accessories.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Straight.</li> <li>2. Curved exceeding 300.00 m radius.</li> <li>3. Curved not exceeding 300.00 m radius.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Existing permanent-way.</li> </ul>
V	<ul style="list-style-type: none"> <li>1. Under occupation.</li> </ul>

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Group	Feature
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VI	1. Under isolation.
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VII	1. Track components supplied by the Employer.
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***Permanent-way  
and permanent-  
way assemblies***

20.13 The items for permanent-way and permanent-way assemblies shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) adzing and boring sleepers;
- (b) cutting and bending rails;
- (c) drilling, screwing, bolting, welding and jointing;
- (d) spikes, rail clips, rail pads, adhesive and other fixing devices;
- (e) wire brushing, oiling and greasing;
- (f) assembling, laying, fixing and adjusting;
- (g) lifting and packing;
- (h) final aligning and levelling;
- (i) destressing;
- (j) markings;
- (k) insulation;
- (l) protective coatings and other surface treatment;
- (m) keeping records and making available to the Engineer.

***Permanent-way  
accessories***

20.14 The items for permanent-way accessories shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) excavating in any material;
- (b) backfilling and compaction;
- (c) disposal of surplus excavated material;
- (d) concrete, reinforcement, formwork and granular materials to foundations;
- (e) protective treatment;
- (f) reinstating;
- (g) keeping records and making available to the Engineer.

## **SLEWING PERMANENT-WAY**

***Units***

20.15 The unit of measurement shall be :

- (i) slewing permanent-way .....linear metre.

***Measurement***

20.16 The measurement of slewing permanent-way shall be the length along the centreline of realigned permanent-way (two-rail) excluding permanent-way assemblies between stock rail joints and/or crossing joints.

**Itemisation** 20.17 Separate items shall be provided for slewing permanent-way in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Slewing permanent-way.
II	1. Different types of permanent-way.
III	1. Straight. 2. Curved exceeding 300.00 m radius. 3. Curved not exceeding 300.00 m radius.
IV	1. Existing permanent-way.
V	1. Under occupation.
VI	1. Under isolation.

**Slewing** 20.18 The items for slewing permanent-way shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) dismantling;
- (b) skeletonising;
- (c) cutting rails;
- (d) drilling, screwing, bolting, welding and jointing;
- (e) spikes and clips;
- (f) wire brushing, oiling and greasing;
- (g) re-assembling and relaying;
- (h) lifting and packing;
- (i) final aligning and levelling.

### **RELOCATING PERMANENT-WAY ASSEMBLIES AND PERMANENT-WAY ACCESSORIES**

**Units** 20.19 The unit of measurement shall be :

- (i) relocating permanent-way assemblies, relocating permanent-way accessories .....number.

**Itemisation** 20.20 Separate items shall be provided for relocating permanent-way assemblies and accessories in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Relocating permanent-way assemblies. 2. Relocating permanent-way accessories.
II	1. Different types of permanent-way assemblies. 2. Different types of permanent-way accessories.
III	1. Existing permanent-way.
IV	1. Under occupation.
V	1. Under isolation.

***Relocating permanent-way accessories***

20.21 The items for relocating permanent-way assemblies shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) dismantling;
- (b) skeletonising;
- (c) cutting rails;
- (d) spikes and clips;
- (e) drilling, screwing, bolting and welding;
- (f) wire brushing, oiling and greasing;
- (g) re-assembling, relaying, refixing and adjusting;
- (h) lifting and packing;
- (i) final alignment and levelling.

***Relocating permanent-way accessories***

20.22 The items for relocating permanent-way accessories shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) excavating in any material;
- (b) backfilling and compaction;
- (c) disposal of surplus excavated material;
- (d) concrete, reinforcement, formwork and granular materials to foundations;
- (e) protective treatment;
- (f) reinstating.

## SECTION 21

### SOLID WASTE DISPOSAL

*Note* 21.01 Excavation, deposition and imported fill for covering material shall be measured in accordance with the units of measurement, measurements and itemisation set out in the Earthworks Section.

### CONTROLLED TIPPING

*Units* 21.02 The unit of measurement shall be :

(i) controlled tipping .....tonne.

*Measurement* 21.03 The measurement of controlled tipping shall be the net weight of material brought into the Site by vehicle. Such net weight shall be the difference between the laden weights of vehicles on entering the Site and the unladen weights of those vehicles on leaving the Site, as measured by the weighbridge.

*Itemisation* 21.04 Separate items shall be provided for controlled tipping in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Controlled tipping.
II	1. Materials provided by others. 2. Extra over for unloading materials provided by others. 3. Materials provided and placed by others. 4. Materials provided by others and collected by the Contractor.
III	1. Different types of materials.
IV	1. Different sources and points of collection.

*Controlled tipping* 21.05 The items for controlled tipping shall, in accordance with General Preambles paragraph 2, include for :

*Item coverage* (a) supervisors to direct the deposition of solid waste at designated

- locations;
- (b) disposal of particular wastes which require special treatment;
- (c) equipment and assistance for carrying out density tests for sampling of effluent and gas;
- (d) spreading, levelling and compaction of covering materials;
- (e) placing, spreading, levelling and trimming in layers;
- (f) protecting and maintaining surfaces;
- (g) compacting;
- (h) benching;
- (i) temporary access and drainage systems, including subsequent removal;
- (j) towing vehicles;
- (k) extinguishing fires, including firefighting equipment and subsequent removal;
- (l) water spraying, including providing water and subsequent removal;
- (m) lighting, including subsequent removal;
- (n) removing materials dropped on Site;
- (o) loading into transport;
- (p) stockpiling, including providing areas for stockpiling;
- (q) transporting within the Site;
- (r) unloading from transport.

## **EXCAVATION IN TIP**

- Units**                    21.06    The unit of measurement shall be :
- (i)      excavation in tip .....cubic metre.
- Measurement**           21.07    The measurement for excavation in tip shall be the volume of void formed by the excavation to the lines and levels directed by the Engineer.
- 21.08    The total value of any one excavation in tip shall be assigned to the item with a depth range within which its maximum depth falls.
- Itemisation**            21.09    Separate items shall be provided for excavation in tip in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Excavation in tip.
II	1. Depth not exceeding 3.00 m. 2. Depth exceeding 3.00 m but not exceeding 6.00 m and so on in steps of 3.00 m.

- Excavation in tip**           21.10    The items for excavation in tip shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) loading into transport and transportation within the Site;
  - (b) loosening and breaking up material before or in the process of excavation;
  - (c) multiple handling of excavated material;
  - (d) selection and separation of materials;
  - (e) cleaning, preparing and trimming surfaces;
  - (f) temporary access and drainage systems, including subsequent removal;
  - (g) backfilling and compacting;
  - (h) covering materials;
  - (i) gas abatement measures, including gas detection equipment and ventilation.

## WATERPROOFING

- Units** 21.11 The unit of measurement shall be :
- (i) waterproof sheeting, bitumen emulsion .....square metre.

- Measurement** 21.12 The measurement of waterproofing shall be the area of surface to be covered. No allowance shall be made for surface irregularities and other local peculiarities.

- Itemisation** 21.13 Separate items shall be provided for waterproofing in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Waterproof sheeting.</li> <li>2. Bitumen emulsion.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types and thicknesses of waterproof sheeting.</li> <li>2. Numbers of coats of bitumen emulsion.</li> </ul>

- Waterproofing** 21.14 The items for waterproofing shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) cleaning and preparing surfaces;
  - (b) joints and laps;
  - (c) protecting and maintaining surfaces;
  - (d) levelling courses;
  - (e) anchorages and anchor blocks;
  - (f) blocking up weepholes in chunam.

## SETTLEMENT MARKERS

- Units** 21.15 The units of measurement shall be :

- (i) settlement markers .....number.
- (ii) settlement marker extensions .....linear metre.

**Itemisation**

21.16 Separate item shall be provided for settlement markers in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Settlement markers.</li> <li>2. Settlement marker extensions.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types and sizes.</li> </ul>

**Settlement markers and extensions**

21.17 The items for settlement markers and settlement marker extensions shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) excavation in any material;
- (b) backfilling and compaction;
- (c) disposal of surplus excavated material;
- (d) concrete, reinforcement, formwork and granular materials to foundations;
- (e) protective treatment;
- (f) reinstating;
- (g) taking readings, measurements, observations and records, and supplying the records to the Engineer.

**WEIGHBRIDGE**

**Units**

21.18 The units of measurement shall be :

- (i) weighbridge, removal of weighbridge, handing over weighbridge to the Employer, repositioning weighbridge .....number.
- (ii) operation and maintenance of weighbridge .....week.

**Measurement**

21.19 The measurement of operation and maintenance of weighbridge shall be the weeks during which the weighbridge is operational.

**Itemisation**

21.20 Separate items shall be provided for weighbridge in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
-------	---------



- I
  1. Weighbridge.
  2. Operation and maintenance of weighbridge.
  3. Removal of weighbridge.
  4. Handing over weighbridge to the Employer.
  5. Repositioning weighbridge.

**Weighbridge** 21.21 The items for weighbridge shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) provision of areas within the Site;
- (b) excavation, levelling and preparation of the site;
- (c) foundations, bases and hardstandings;
- (d) water, sanitation, heating, air conditioning, power, lighting, telephone and communication services;
- (e) fences, notices and direction boards;
- (f) tests and calibration of the weighbridge before use;
- (g) recorder house including furniture.

**Operation and maintenance of weighbridge** 21.22 The items for operation and maintenance of weighbridge shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) accessories for recording readings;
- (b) calibration and checking;
- (c) repairs and maintenance;
- (d) charges for water, heating, power, lighting and telephone;
- (e) weighbridge operators.

**Removal of weighbridge** 21.23 The items for removal of weighbridge shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) breaking up and disposal of foundations and the like;
- (b) dismantling and removal of recorder house;
- (c) disconnecting and removing services, and sealing of disused services;
- (d) filling pit and reinstatement.

**Handing over weighbridge to the Employer** 21.24 The items for handing over weighbridge to the Employer shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) receiving back supplies, furniture and equipment not required by the Employer;
- (b) refurbishing, replacing, repairing and repainting.

**Repositioning weighbridge** 21.25 The items for repositioning weighbridge shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) provision of areas within the Site;
- (b) excavation, levelling and preparation of the site;

- (c) foundations, bases and hardstandings;
- (d) water, sanitation, heating, air conditioning, power, lighting, telephone and communication services;
- (e) fences, notices and direction boards;
- (f) tests and calibration of the weighbridge before use;
- (g) recorder house including furniture;
- (h) breaking up and disposal of foundations and the like;
- (i) dismantling and removal of recorder house;
- (j) disconnecting and removing services, and sealing off disused services;
- (k) backfilling pit and reinstatement.

## **GAS OUTLETS**

- Units** 21.26 The units of measurement shall be :
- (i) gas outlets .....number.
  - (ii) gas outlet extensions, driving gas outlet pipes and extensions .....linear metre.
- Measurement** 21.27 The measurement of driving gas outlet pipes and extensions shall be the length of pipe measured from the formed surface at the time of driving to the tip of the shoe.
- Itemisation** 21.28 Separate items shall be provided for gas outlets in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature   |
|-------|---|
| I     | <ul style="list-style-type: none"> <li>1. Gas outlets.</li> <li>2. Gas outlet extensions.</li> <li>3. Driving gas outlet pipes and extensions.</li> </ul>   |
| II    | <ul style="list-style-type: none"> <li>1. Different types and sizes of gas outlets and extensions.</li> </ul>   |
| III   | <ul style="list-style-type: none"> <li>1. Different diameters of pipes.</li> </ul>  |
| IV    | <ul style="list-style-type: none"> <li>1. Depth of driving not exceeding 5.00 m.</li> <li>2. Depth of driving exceeding 5.00 m but not exceeding 10.00 m and so on in steps of 5.00 m.</li> </ul> |
- Gas outlets and gas outlet extensions** 21.29 The items for gas outlets and gas outlet extensions shall, in accordance with General Preambles paragraph 2, include for :
- (a) excavation in any material;
  - (b) backfilling and compaction;
- Item coverage**

- (c) disposal of surplus excavated material;
- (d) concrete, reinforcement, formwork and granular materials to foundations;
- (e) protective treatment;
- (f) reinstating;
- (g) pipes, sockets, shoes and cap covers;
- (h) joints;
- (i) perforating, jointing, cutting and welding.

***Driving gas outlet  
pipes and  
extensions***

21.30 The items for driving gas outlet pipes and extensions shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) driving in any material.



**SECTION 22****BRICKWORK AND MASONRY****BRICKWORK AND BLOCKWORK**

- Units** 22.01 The unit of measurement shall be :
- (i) brickwork, blockwork .....square metre.
- Measurement** 22.02 The measurement for brickwork and blockwork shall be the length or girth along the centreline multiplied by the vertical height stating the thickness, or in the case of walls with battered faces, stating the average thickness. No deduction shall be made for openings each not exceeding 0.10 square metres.
- Itemisation** 22.03 Separate items shall be provided for brickwork and blockwork in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | 1. Different types of brickwork.<br>2. Different types of blockwork.         |
| II    | 1. Different thicknesses.  |
| III   | 1. Different bonds.  |
| IV    | 1. Curved on plan.   |
| V     | 1. With a battered face.   |
| VI    | 1. In walls.<br>2. In facework.<br>3. In columns and piers.<br>4. In arches. |
- Brickwork and blockwork** 22.04 The items for brickwork and blockwork shall, in accordance with General Preambles paragraph 2, include for :
- (a) jointing, pointing and fair-faced work, including rough and fair

- cutting;
- (b) brick copings, bands, plinths, corbels, sills, bull-noses and the like;
  - (c) forming chases, rebates, recesses, angles, quoins and the like;
  - (d) ties, dowels, cramps, joggles and the like;
  - (e) centering and temporary supports;
  - (f) bonding into existing work;
  - (g) reinforcement;
  - (h) filling the cavity between the brickwork and the backing;
  - (i) building in doors, windows, louvres, lintels, sills, pipes, holdfasts, bolts and the like and forming small openings;
  - (j) construction and subsequent demolition of trial panels;
  - (k) damp proof courses.

## MASONRY

- Note** 22.05 The term masonry shall be taken for the purpose of this Section to include cast stonework.
- Units** 22.06 The units of measurement shall be :
- (i) mass masonry .....cubic metre.
  - (ii) masonry facing, masonry walls .....square metre.
  - (iii) coping, specially shaped and dressed string courses, arches and the like .....linear metre.
  - (iv) individual masonry blocks, features or stones .....number.
- Measurement** 22.07 For mass masonry no deduction shall be made from the measurement for voids each not exceeding 0.15 cubic metres.
- 22.08 The measurement of masonry facing and masonry walls shall be the length or girth along the centreline multiplied by the vertical height stating the thickness, or in the case of walls with battered faces, stating the average thickness. No deduction shall be made for openings each not exceeding 0.10 square metres.
- Itemisation** 22.09 Separate items shall be provided for masonry in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
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- |   |   |
|---|---|
| I | <ol style="list-style-type: none"> <li>1. Mass masonry.</li> <li>2. Masonry facing.</li> <li>3. Masonry wall.</li> <li>4. Masonry coping.</li> <li>5. Specially shaped and dressed string courses of masonry.</li> <li>6. Arches.</li> <li>7. Individual masonry blocks, features or stones.</li> </ol> |
|---|---|
-

Group	Feature
II	1. Different types.
III	1. Different thicknesses.
IV	1. Different coursing.
V	1. Curved on plan.
VI	1. With a battered face.
VII	1. In lining to watercourses. 2. In pitching to slopes. 3. In facing to seawalls.

**Masonry**

22.10 The items for masonry shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) setting, bedding, jointing, coursing, forming angles and quoins, grouting, pointing and fair-faced work, including rough and fair cutting;
- (b) centering and temporary supports;
- (c) bonding into existing work;
- (d) ties, dowels, cramps, joggles or other fixing devices, including sinkings, mortices and running in;
- (e) tying to concrete or other types of structures;
- (f) filling the cavity between the masonry and the backing;
- (g) building in doors, windows, louvres, lintels, sills, pipes, holdfasts, bolts and the like, and forming small openings;
- (h) damp proof course;
- (i) reinforcement;
- (j) forming grooves, rebates, recesses, stoolings and weatherings;
- (k) marking for identification and delivery in any matching sequence;
- (l) construction and subsequent demolition of trial panels;
- (m) temporary protection and subsequent removal.





## SECTION 23

### FINISHINGS

#### FINISHINGS

- Units** 23.01 The units of measurement shall be :
- (i) finishings, painting .....square metre.
  - (ii) skirtings, nosings and the like .....linear metre.
- Measurement** 23.02 The measurement of finishings shall be the area of the exposed face. No deduction shall be made for openings each not exceeding one square metre.
- Itemisation** 23.03 Separate items shall be provided for finishings in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | <ul style="list-style-type: none"> <li>1. Different types of finishings.</li> <li>2. Different types of skirtings, nosings and the like.</li> <li>3. Different types of painting.</li> </ul>                 |
| II    | <ul style="list-style-type: none"> <li>1. Different thicknesses of finishings.</li> <li>2. Different sizes of skirtings, nosings and the like.</li> </ul>  |
| III   | <ul style="list-style-type: none"> <li>1. To soffits and beams.</li> <li>2. To walls and columns.</li> <li>3. To floors.</li> <li>4. To roofs.</li> <li>5. To kerbs, treads, risers and the like.</li> </ul> |
| IV    | <ul style="list-style-type: none"> <li>1. Curved.</li> </ul>   |
| V     | <ul style="list-style-type: none"> <li>1. Internal.</li> <li>2. External.</li> </ul>   |
- Finishings, etc.** 23.04 The items for finishings, painting, skirtings, nosings and the like shall, in accordance with General Preambles paragraph 2, include for :
- (a) preparation of the surface to receive the finishing or to be painted;
  - (b) beds and backings, adhesive, bitumen and the like;

- (c) ties, lathing, reinforcement, beads, grounds and the like;
- (d) vapour barrier;
- (e) forming angles, edges, joints, working into channels and recessed covers and working around pipes, metal sections and the like;
- (f) cutting tiles at angles, boundaries and the like and around pipes, metal sections and the like;
- (g) special tiles at edges, angles and corners;
- (h) ends, angles, outlets and ramps to skirtings, nosings and the like;
- (i) pointing, grouting, surface dressing and finishing;
- (j) construction and subsequent demolition of trial panels of finishings;
- (k) polishing;
- (l) masking adjacent surfaces to prevent contamination during painting;
- (m) displaying warning signs adjacent to newly painted surfaces.

## SECTION 24

### LANDSCAPE SOFTWARES AND ESTABLISHMENT WORKS

#### PREPARATION WORKS

- Units** 24.01 The unit of measurement shall be :
- (i) ground cleaning, scarifying, ripping, cultivation, soiling, soil conditioners, fertilizers, mulching .....square metre.
- Itemisation** 24.02 Separate items shall be provided for preparation works in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | <ol style="list-style-type: none"> <li>1. Ground cleaning.</li> <li>2. Scarifying.</li> <li>3. Ripping.</li> <li>4. Cultivation.</li> <li>5. Soiling.</li> <li>6. Soil conditioners.</li> <li>7. Fertilizers.</li> <li>8. Mulching.</li> </ol> |
| II    | <ol style="list-style-type: none"> <li>1. Different depths.</li> <li>2. Different rates of application.</li> </ol>   |
- Ground cleaning** 24.03 The items for ground cleaning shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) removal of all rubbish, weeds, stones and other debris, and disposal off Site;
- (b) excavation and disposal of contaminated ground, and replacement with imported soil.
- Scarifying, ripping and cultivation** 24.04 The items for scarifying, ripping and cultivation shall, in accordance with General Preambles paragraph 2, include for:
- Item coverage**
- (a) removal of stones and all debris produced by scarifying, ripping and cultivation, and disposal off Site;
- (b) protection of prepared ground against compaction, erosion and siltation.
- Soiling** 24.05 The items for soiling shall, in accordance with General Preambles paragraph 2,

include for:

***Item coverage***

- (a) mixing, depositing, spreading, levelling and consolidation;
- (b) multiple handling;
- (c) protection of prepared ground against compaction, erosion and siltation;
- (d) soil-mix from any source.

***Soil conditioners, fertilizers and mulching***

24.06 The items for soil conditioners, fertilizers and mulching shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) storage and multiple handling;
- (b) spreading and levelling.

## PLANTING WORKS

***Units***

24.07 The units of measurement shall be :

- (i) grassing .....square metre.
- (ii) trees, shrubs and other stated plants .....number.

***Itemisation***

24.08 Separate items shall be provided for planting works in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Grassing.</li> <li>2. Trees.</li> <li>3. Shrubs.</li> <li>4. Other stated plants.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Broadcast seeding.</li> <li>2. Hydroseeding.</li> <li>3. Turfing.</li> <li>4. Sprigging.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Different species.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Different sizes.</li> </ul>
V	<ul style="list-style-type: none"> <li>1. Rootballed.</li> <li>2. Containerised.</li> </ul>

***Grassing***

24.09 The items for grassing shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage*
- (a) surface preparation, including removal of stones, fine tilth cultivation and final grading;
  - (b) pegging, netting, sheeting and biodegradable fabric;
  - (c) fertilising, soil conditioning, mulching and topdressing;
  - (d) watering, weeding and cutting.

*Trees, shrubs and other stated plants*      24.10      The items for trees, shrubs and other stated plants shall, in accordance with General Preambles paragraph 2, include for:

- Item coverage*
- (a) excavation, backfill and disposal off Site of all surplus and unsuitable material;
  - (b) fertilising, soil conditioning, mulching and top dressing;
  - (c) watering, weeding and pruning;
  - (d) stakes, ties, guys, sleeves and adjusters;
  - (e) reinstatement.

**ESTABLISHMENT WORKS**

- Units*      24.11      The units of measurement shall be :
- (i) General establishment works .....item.
  - (ii) Weeding, post-planting fertiliser to grass and shrub areas, grass cutting, mulching and forking over .....square metre.
  - (iii) Post-planting fertiliser to trees, pruning of specified plants .....number.

*Itemisation*      24.12      Separate items shall be provided for establishment works in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. General establishment works.</li> <li>2. Weeding.</li> <li>3. Post-planting fertiliser.</li> <li>4. Grass cutting.</li> <li>5. Mulching.</li> <li>6. Forking-over.</li> <li>7. Pruning.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Planted areas in bare ground.</li> <li>2. Planted areas other than in bare ground.</li> </ul>

Group      Feature

- 
- |     |   |
|-----|---|
| III | <ol style="list-style-type: none"> <li>1. Different categories of grass.</li> <li>2. Different sizes of tree.</li> <li>3. Different species of shrubs.</li> </ol> |
|-----|---|
- 

- |    |  |
|----|--|
| IV | <ol style="list-style-type: none"> <li>1. Different depths.</li> </ol> |
|----|--|
- 

***General establishment works***

- 24.13 The items for general establishment works shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) watering;
- (b) insect and pest control;
- (c) protecting, including netting and sheeting;
- (d) removing litter, stones, rubbish and the like;
- (e) firming up;
- (f) regrassing where the grass fails to become established;
- (g) securing and adjusting stakes, ties and guys;
- (h) plant replacements and replanting;
- (i) fencing, signboards and notices.

***Weeding, grass cutting, forking-over and pruning***

- 24.14 The items for weeding, grass cutting, forking-over and pruning shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) removal of all organic and other debris produced by the weeding, grass cutting, forking-over and pruning, and disposal off Site;
- (b) firming-up any plant material affected by the item;
- (c) reinstatement.

***Fertilisers and mulching***

- 24.15 The items for fertilisers and mulching shall, in accordance with General Preambles paragraph 2, include for :

***Item coverage***

- (a) storage and multiple handling;
- (b) spreading and levelling.

## SECTION 25

### TESTING

#### PILE TESTING

- Units**
- 25.01 The units of measurement shall be :
- (i) establishment of pile testing equipment .....item.
  - (ii) load test, integrity test .....number.
  - (iii) sonic test, core test .....linear metre.
  - (iv) other stated test .....number, linear metre.
- Measurement**
- 25.02 Establishment of pile testing equipment shall be measured separately for each bridge or structure.
- 25.03 The measurement of load tests and integrity tests shall be the number of tests ordered by the Engineer.
- 25.04 The measurement of sonic tests shall be the total length of tested pile as ordered by the Engineer.
- 25.05 The measurement of core tests shall be the total length of pile drilled as ordered by the Engineer.
- 25.06 The measurement of other stated tests shall be the total length of tested pile or the number of tests ordered by the Engineer.
- 25.07 Re-testing or additional testing where the original test has identified defective materials or workmanship shall not be measured.
- Itemisation**
- 25.08 Separate items shall be provided for pile testing in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ol style="list-style-type: none"> <li>1. Establishment of pile testing equipment.</li> <li>2. Load test.</li> <li>3. Sonic test.</li> <li>4. Core test.</li> <li>5. Integrity test.</li> <li>6. Other stated tests.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types of tests.</li> </ol>

Group	Feature
III	1. Different types of piles.
IV	1. Preliminary piling. 2. Main piling.
V	1. Load tests of different specified load and/or different angles of application of load.
VI	1. Different diameters of cores.

<b><i>Establishment of pile testing equipment</i></b>	25.09	The items for establishment of pile testing equipment shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) bringing test rigs, kentledge and equipment for load tests, boring rigs, sonic testing equipment, integrity testing equipment and plant, and material and equipment necessary to perform any other stated tests to the site of the bridge or other structure, maintaining and subsequently removing them;</li> <li>(b) moving between test sites.</li> </ul>
<b><i>Load test, sonic test, etc.</i></b>	25.10	The items for load test, sonic test, core test, integrity test and other stated tests shall, in accordance with General Preambles paragraph 2, include for :
<b><i>Item coverage</i></b>		<ul style="list-style-type: none"> <li>(a) setting up rigs, kentledge, cable anchorages, anchor piles and reference bench marks;</li> <li>(b) setting up, operating, calibrating and maintaining instruments and apparatus required to complete the test;</li> <li>(c) constructing temporary pile caps and subsequently stripping off;</li> <li>(d) applying and re-applying the test load, and releasing;</li> <li>(e) taking readings, measurements and observations of the test, and recording and supplying the record of each test to the Engineer;</li> <li>(f) recovery and storage of cores;</li> <li>(g) cutting and test of cores;</li> <li>(h) reinstatement of bore hole;</li> <li>(i) re-testing and additional testing.</li> </ul>



## TESTING PRECAST CONCRETE MEMBERS

- Units** 25.11 The unit of measurement shall be :
- (i) testing precast concrete members .....number.
- Measurement** 25.12 The measurement of testing precast concrete members shall be the number of tests ordered and accepted by the Engineer as giving satisfactory results.
- Itemisation** 25.13 Separate items shall be provided for testing precast concrete members in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Non destructive tests. 2. Destructive tests.
II	1. Different types of test.
III	1. Different types of precast concrete member.
IV	1. Different sizes of member.

- Testing precast concrete members** 25.14 The items for testing precast concrete members shall, in accordance with the General Preambles paragraph 2, include for:
- Item coverage**
- (a) transportation of members to and erection at the place of test, and subsequent removal;
  - (b) the cost of testing at the Contractor's option, all other prestressed members in the same batch of members as that member found on test to be unsatisfactory;
  - (c) taking readings, measurements and observations of members under test, and recording and supplying the record of each test to the Engineer;
  - (d) in the case of destructive tests supply of the member.

## TESTING BEARINGS

- Units** 25.15 The unit of measurement shall be :
- (i) testing bearings .....number.
- Measurement** 25.16 The measurement of testing bearings shall be the number of tests ordered and

accepted by the Engineer as giving satisfactory results.

**Itemisation**

25.17 Separate items shall be provided for testing bearings in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Compression tests. 2. Shear tests. 3. Bond tests. 4. Tests for physical properties. 5. Weathering tests. 6. Friction tests. 7. Vertical load tests. 8. Horizontal load tests. 9. Other tests.
II	1. Different types of bearings.
III	1. Different sizes of bearings.

**Testing bearings**

25.18 The items for testing bearings shall, in accordance with the General Preambles paragraph 2, include for :

**Item coverage**

- (a) taking readings, measurements and observations of the performance of bearings under test, and recording and supplying the record of each test to the Engineer;
- (b) in the case of destructive tests, supply of the sample;
- (c) re-testing.

**PRESSURE TESTING PIPE JOINTS, PIPELINES AND FITTINGS**

**Units**

25.19 The unit of measurement shall be :

- (i) pressure testing pipe joints, pressure testing pipelines, pressure testing pipe fittings .....number.

**Measurement**

25.20 The measurement of pressure testing pipe joints and pipe fittings shall be the number of joints and fittings tested as ordered and accepted by the Engineer as giving satisfactory results.

25.21 The measurement of pressure testing pipelines shall be the number of sections of the pipeline tested as ordered and accepted by the Engineer as giving satisfactory results.

**Itemisation**

25.22 Separate items shall be provided for pressure testing pipe joints, pipelines and pipe fittings in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Pressure testing pipe joints. 2. Pressure testing pipelines. 3. Pressure testing pipe fittings.
II	1. Different types of joints. 2. Different types of fittings.
III	1. Different pipe diameters.

**Pressure testing pipe joints**

25.23 The items for pressure testing pipe joints shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) additional internal or external welding to pipe joints;
- (b) tapping holes and installing pipe sockets for fitting the compressed air system;
- (c) compressed air and water, including taking delivery of water supplied by the Employer, transporting to Site and/or point of use and draining on completion;
- (d) taking readings, measurements and observations of joints under test, and recording and supplying the record of each test to the Engineer;
- (e) re-testing.

**Pressure testing pipelines**

25.24 The items for pressure testing pipelines shall, in accordance with General Preambles paragraph 2, include for:

**Item coverage**

- (a) excavation for and construction of temporary anchor or thrust blocks, and their subsequent removal and backfilling;
- (b) connections and pumps for the charging and discharging of the pipeline;
- (c) temporary strutting;
- (d) caps and blank flanges;
- (e) water, including taking delivery of water supplied by the Employer, transporting to Site and/or point of use and draining on completion;
- (f) taking readings, measurements and observations of the pipeline under test, and recording and supplying the record of each test to the Engineer;
- (g) re-testing;
- (h) checking cleanlines of the pipeline and ensuring that the valves are

fully open prior to the pressure testing.

**Pressure testing  
pipe fittings**

25.25 The items for pressure testing pipe fittings shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) connections and pumps for the charging and discharging of the pipeline;
- (b) temporary strutting and supports;
- (c) water, including taking delivery of water supplied by the Employer, transporting to Site and/or point of use and draining on completion;
- (e) taking reading, measurements and observations of the fittings under test and recording and supplying the records of each test to the Engineer;
- (f) re-testing.

**TESTING WATER RETAINING STRUCTURES**

**Units**

25.26 The unit of measurement shall be :

- (i) testing water retaining structures .....item.

**Itemisation**

25.27 Separate items shall be provided for testing water retaining structures in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Testing water retaining structures.
II	1. Different types or sections of structures.

**Testing water  
retaining  
structures**

25.28 The items for testing water retaining structures shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) cleaning and sterilizing including taking delivery of water and sterilizing chemicals supplied by the Employer, transporting to Site and/or point of use and draining on completion of test;
- (b) taking delivery of water for testing supplied by the Employer, transporting to Site and/or point of use and draining on completion;
- (c) connections and pumps for the charging and discharging;
- (d) temporary strutting;
- (e) caps and blank flanges;
  
- (f) taking reading, measurements and observations of the structure under test, and recording and supplying the record of each test to the Engineer, including taking delivery of testing equipment

- supplied by the Employer, transporting to Site and/or point of use and removal on completion of test;
- (g) temporary enclosure for testing equipment and removal on completion;
- (h) re-testing including supply of water and equipment and removal on completion of test.

**TESTING WELDS**

- Units**                    25.29    The unit of measurement shall be :
- (i)    testing welds .....number.
- Measurement**            25.30    The measurement of testing welds shall be the number of tests ordered and accepted by the Engineer as giving satisfactory results.
- Itemisation**            25.31    Separate items shall be provided for testing welds in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | 1. Non-destructive test.<br>2. Destructive test. |
| II    | 1. Different types of test.                      |
| III   | 1. Different types of weld.                      |
| IV    | 1. Different types of member.                    |
- Testing welds**            25.32    The items for testing welds shall, in accordance with the General Preambles paragraph 2, include for :
- Item coverage**
- (a) setting up, operating and maintaining instruments and apparatus required to complete the test;
  - (b) taking readings, measurements and observations of welds under test, and recording and supplying one copy of the record of each test to the Engineer;
  - (c) in the case of destructive tests, supply of the sample;
  - (d) re-testing.



## SECTION 26

### MISCELLANEOUS

#### DOORS, WINDOWS, LOUVRES AND ROLLER SHUTTERS

- Units** 26.01 The unit of measurement shall be :
- (i) doors, windows, louvres, roller shutters .....number.
- Itemisation** 26.02 Separate items shall be provided for doors, windows, louvres and roller shutters in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature  |
|-------|--|
| I     | 1. Doors.<br>2. Windows.<br>3. Louvres.<br>4. Roller shutters. |
| II    | 1. Different types.<br>2. Different materials.                 |
| III   | 1. Different sizes.  |
- Doors, windows, etc.** 26.03 The items for doors, windows, louvres and roller shutters shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) frames, guide rails, hoods, casings and the like;  
 (b) bedding and pointing;  
 (c) dowels, cramps, bolts, adhesive, timber pellets, sealants and the like;  
 (d) glazing, including beads, putty and sealing;  
 (e) fittings and furniture and flyscreens;  
 (f) preservatives, protective treatment and painting;  
 (g) rat guards, weather bars, weather strips, waterstops, security bars and the like;  
 (h) window poles;  
 (i) forming holes, pockets, sockets, mortices joints, and the like;  
 (j) fabrication drawings.

## PLUMBING

- Units** 26.04 The units of measurement shall be :
- (i) pipes .....linear metre.
  - (ii) extra over for valves and stopcocks .....number.
  - (iii) sanitary appliances .....number.
- Itemisation** 26.05 Separate items shall be provided for plumbing in accordance with General Principles paragraphs 3 and 4 and the following :
- | Group | Feature   |
|-------|---|
| I     | 1. Pipes.<br>2. Extra over for valves and stopcocks.<br>3. Sanitary appliances. |
| II    | 1. Different types.<br>2. Different materials.                                  |
| III   | 1. Different sizes or diameters.  |
- Pipes, etc.** 26.06 The items for pipes, extra over for valves and stopcocks shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) bends, junctions, tees, tapers, joints, cleaning eyes, inspection doors, adaptors, connectors and the like;
  - (b) fixings, hangers, brackets, blocks and the like;
  - (c) labelling and marking;
  - (d) external protection, insulation, and painting;
  - (e) in the case of water supply pipes, cleansing and sterilisation, including taking delivery of water and chemicals supplied by the Employer, transportation to Site and/or point of use and draining on completion.
- Sanitary appliances** 26.07 The items for sanitary appliances shall, in accordance in General Preambles paragraph 2, include for :
- Item coverage**
- (a) joints to pipes;
  - (b) fixings, brackets and the like;
  - (c) bedding, jointing, pointing and sealing;
  - (d) chains, plugs, handles, taps, roses, cisterns, traps and the like.



## SUNDRY METALWORK

- Units** 26.08 The units of measurement shall be :
- (i) flooring .....square metre.  
(ii) covers, ladders, step irons .....number.
- Measurement** 26.09 Sundry metalwork shall only be measured where the items are not included in the item coverage of other work.
- Itemisation** 26.10 Separate items for sundry metalwork shall be provided in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
I	<ol style="list-style-type: none"> <li>1. Flooring.</li> <li>2. Covers.</li> <li>3. Ladders.</li> <li>4. Step irons.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types.</li> <li>2. Different materials.</li> </ol>
III	<ol style="list-style-type: none"> <li>1. Different sizes.</li> </ol>

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- Sundry metalwork** 26.11 The items for sundry metalwork shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) forming holes, pockets, sockets, mortices and the like;  
(b) building in, including fixings, grouting and bedding, casting in bolts, baseplates and the application of bonding agents, fillers and sealing materials;  
(c) protective treatment and painting;  
(d) insulation;  
(e) frames;  
(f) ironmongery.

## ASPHALT ROOFING

- Units** 26.12 The units of measurement shall be :
- (i) asphalt roofing .....square metre.  
(ii) skirtings .....linear metre.
- Measurement** 26.13 The measurement of asphalt roofing shall be the plan area covered. No

deduction shall be made for opening each not exceeding one square metre.

**Itemisation**

26.14 Separate items for asphalt roofing shall be provided in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	1. Asphalt roofing. 2. Skirtings.
II	1. Horizontal surfaces and inclined surfaces sloping at 30 <sup>0</sup> or less to the horizontal. 2. Vertical surfaces and inclined surfaces sloping at more than 30 <sup>0</sup> to the horizontal. 3. Different thicknesses of asphalt roofing. 4. Different sizes of skirtings.
III	1. Curved. 2. Domed.

**Asphalt roofing**

26.15 The items for asphalt roofing shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) preparation, cleaning and drying surfaces;
- (b) isolating membrane;
- (c) reinforcement;
- (d) forming angle fillets, internal angles, mitres, stops and the like;
- (e) dressing into rainwater outlets, including flashings;
- (f) cleaning and priming metal surfaces affected by roofing;
- (g) sealing at edges and around interruptions and projections;
- (h) dressing around pipe sleeves passing through roof;
- (i) surface finishing;
- (j) solar protection;
- (k) screeding and forming drainage channels.

**Skirtings**

26.16 The items for skirtings shall, in accordance with General Preambles paragraph 2, include for :

**Item coverage**

- (a) preparing, cleaning and drying surfaces;
- (b) isolating membrane;
- (c) reinforcement;
- (d) turning top edge into groove, including forming or cutting groove;
- (e) forming angle fillets, internal angles, mitres, stops and the like;
- (f) surface finishing;
- (g) solar protection.

**Note** 26.17 Internal fire barriers shall be measured in accordance with the units of measurement, measurements and itemisation set out in the relevant Sections for Formwork, Steel Reinforcement, Concrete, Brickwork and Masonry, Miscellaneous and the like.

**Units** 26.18 The units of measurement shall be :

- (i) electrical conduits, cable ducts .....linear metre.
- (ii) light fittings, earthing pits .....number.
- (iii) earthing trenches .....linear metre.
- (iv) grouting .....square metre.

**Itemisation** 26.19 Separate items shall be provided for electrical conduits, cable ducts, light fittings, earthing pits, earthing trenches and grouting in accordance with General Principles paragraphs 3 and 4 and the following :

Group	Feature
I	<ul style="list-style-type: none"> <li>1. Electrical conduits.</li> <li>2. Cable ducts.</li> <li>3. Light fittings.</li> <li>4. Earthing pits.</li> <li>5. Earthing trenches.</li> <li>6. Grouting.</li> </ul>
II	<ul style="list-style-type: none"> <li>1. Different types.</li> </ul>
III	<ul style="list-style-type: none"> <li>1. Different diameters.</li> <li>2. Different sizes.</li> <li>3. Different thicknesses.</li> </ul>
IV	<ul style="list-style-type: none"> <li>1. Different types of bed, surround or filling.</li> </ul>
V	<ul style="list-style-type: none"> <li>1. In trench, depth to invert not exceeding 1.50 m.</li> <li>2. In trench, depth to invert exceeding 1.50 m but not exceeding 2.50 m and so on in steps of 1.00 m.</li> <li>3. Fixed to concrete.</li> <li>4. Fixed to brickwork or blockwork.</li> <li>5. Fixed to steelwork.</li> <li>6. Fixed to reinforcement.</li> <li>7. Fixed in chases.</li> <li>8. Fixed to other stated supports or surfaces.</li> </ul>

**Electrical conduits, cable ducts** 26.20 The items for electrical conduits and cable ducts shall, in accordance with General Preambles paragraph 2, include for :

- Item coverage**
- (a) excavation in any material;
  - (b) in the case of conduits and ducts installed below ground, cutting, laying, jointing and bedding conduits or ducts and fittings;
  - (c) in the case of conduits and ducts installed above ground, cutting, fitting and jointing conduits or ducts and fittings;
  - (d) in the case of conduits and ducts installed below ground, laying and compacting bedding, haunching and surround material, backfilling and compaction, reinstatement of topsoil and turf, and disposal of surplus excavated material;
  - (e) in the case of conduits and ducts installed above ground, cutting or forming holes, mortices, pockets, chases and the like, temporary covers and making good;
  - (f) fixings, fittings, hangers, stools and other discreet supports;
  - (g) protective treatment and painting;
  - (h) movement joints;
  - (i) temporary sealing ends of conduits or ducts;
  - (j) measures to prevent collection of condensed moisture or entry of water;
  - (k) cleaning;
  - (l) draw wires, plugs, marker blocks and identification tape.
- Light fittings**                    26.21    The items for light fittings shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) construction of bases or recesses;
  - (b) installation and fixing in position;
  - (c) casting in bolts;
  - (d) internal wiring and connections;
  - (e) internal fuses, switches, cut-outs and the like;
  - (f) testing and commissioning.
- Earthing pits, earthing trenches**                    26.22    The items for earthing pits and earthing trenches shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) excavation in any material;
  - (b) building in duct connections, including ducts and fittings;
  - (c) covers, frames and lifting keys;
  - (d) formwork and moulds;
  - (e) reinforcement and steel sections;
  - (f) backfilling with general fill material and compaction;
  - (g) disposal of surplus excavated material;
  - (h) fill material in pit or trench.
- Grouting**                                    26.23    The items for grouting shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) scabbling concrete surfaces to receive grout;
  - (b) cleaning voids to receive grout;
  - (c) grouting holding down bolts;
  - (d) formwork;
  - (e) curing exposed edges.

## SECTION 27

### DAYWORK

#### DAYWORK

#### *Units*

27.01 The units of measurement shall be :

- (i) labour .....hour.
- (ii) plant .....Provisional Sum.
- (iii) materials .....Provisional Sum.

#### *Measurement*

27.02 The measurement of labour shall be the aggregate time employed on the item of daywork to the nearest hour. Meal breaks and rest periods shall not be measured. Travelling time by labour from their normal place of employment on the Site to and from the location where daywork is to be carried out, shall also be measured.

Normal working hours shall be 0800 hours to 1700 hours on all days excluding General Holidays. Daywork ordered by the Engineer to be executed outside the normal working hours shall be measured as overtime. Overtime shall be paid at the rates for normal working hours plus a percentage to be inserted by the tenderer.

Voluntary overtime on all days including General Holidays will be measured as normal working hours. Voluntary overtime is when the Contractor elects to execute daywork outside the normal working hours.

If, in the opinion of the Engineer, daywork is ordered to be carried out under dangerous or exceptionally foul conditions, then the labour shall be measured as 1.5 times the time spent working under such conditions.

27.03 The rates contained in the "HKCA Schedules For Plant Used in Dayworks Carried Out Incidental to Contract Work" current at the date for return of Tender shall be used for plant employed on daywork. The "Notes and Conditions" contained therein are deleted.

The rates shall be exclusive of drivers and attendants.

Minimum measurement shall be for the basic hire period quoted in the schedule under each item.

An additional 3 hours is to be measured for each item of land-based plant, and an additional 6 hours for each item of marine plant, specially brought on Site on the instructions of the Engineer to carry out daywork, and a further 3 hours or 6 hours for each such respective item of plant that is removed from Site on completion of the daywork.

6 hours is to be measured for any transport used to carry or tow land-based plant, and 12 hours for any transport used to carry or tow marine plant,

to Site for use on daywork, or used for their respective removal from Site on

completion of the daywork.

For land-based plant mounted on marine craft, the percentage adjustment appropriate to marine plant shall apply to the rates quoted for the land-based plant in the schedule.

On-Site transportation of labour, materials or plant used on daywork to or from the daywork location is to be measured.

Standing time shall be included in the measurement of plant where the nature of the daywork requires intermittent working. Where standing time for any item of plant is ordered by the Engineer, such plant shall be measured as two thirds of the time standing during normal working hours.

- 27.04 The measurement of materials shall be the actual quantity of materials incorporated in the Works measured on a daywork basis except if the material is only obtainable in minimum quantities, then any surplus material arising therefrom and which cannot otherwise be used in the Works shall also be measured. Such surplus material may be retained for use by the Employer or disposed of, as directed by the Engineer.

Payment shall be made at invoiced cost after the deduction of all discounts obtained by the Contractor but inclusive of any suppliers' delivery charges to the Site.

Collection and distribution of materials by the Contractor shall be measured.

***Itemisation***

- 27.05 Separate items shall be provided for daywork in accordance with General Principles paragraphs 3 and 4 and the following :

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Group	Feature
I	<ol style="list-style-type: none"> <li>1. Labour working during normal working hours.</li> <li>2. Provisional Sum for labour working overtime.</li> <li>3. Percentage adjustment to the Provisional Sum for labour working overtime.</li> <li>4. Provisional Sum for plant.</li> <li>5. Percentage adjustment to the Provisional Sum for plant.</li> <li>6. Provisional Sum for materials.</li> <li>7. Percentage adjustment to the Provisional Sum for materials.</li> </ol>
II	<ol style="list-style-type: none"> <li>1. Different types of labour.</li> <li>2. Different periods of overtime.</li> <li>3. Different categories of plant.</li> </ol>

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- Labour** 27.06 The items for labour shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) hand tools, ladders, trestles and the like;
  - (b) protective clothing and safety equipment;
  - (c) supervision;
  - (d) use of existing services and temporary works;
  - (e) meal breaks and rest periods;
  - (f) travelling time to and from the Site.
- Plant** 27.07 The items for plant used on daywork shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) fuel, consumable stores, insurance, repairs and maintenance.
- Percentage addition to materials** 27.08 The items for percentage addition to materials used on daywork shall, in accordance with General Preambles paragraph 2, include for :
- Item coverage**
- (a) taking delivery, unloading, unpacking, storing and protecting.

