

**CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT
GEOTECHNICAL ENGINEERING OFFICE**

**GROUND INVESTIGATION NOTE NO. 1/2008
HANDLING OF GROUND INVESTIGATION, GEOPHYSICAL SURVEY, AND
LABORATORY TESTING REQUESTS**

1. INTRODUCTION

- 1.1 The purpose of this Note is to enable clients and their consultants to make the best use of the ground investigation (GI), geophysical survey (GS), and laboratory testing (LT) services (soil and rock testing, and chemical and biological testing of marine sediments, soil and groundwater from contaminated land) provided through the term/service contracts of GEO. Clients and consultants should provide copies of this Note to their project engineers and other staff engaged in arranging GI, GS, or LT services.
- 1.2 All requests are dealt with in accordance with WBTC No. 13/90. The financial limits for individual requests normally accepted by GEO are \$3M for land-GI or GS and \$6M for marine-GI for existing term contracts. The limits have been adjusted to \$4M for land-GI or GS and \$8M for marine-GI for term contracts awarded in 2009 and thereafter. A department or their consultants should normally let an individual GI contract or make provisions in their capital works contract for carrying out GI or GS works with value exceeding these limits. However, depending on workload of the GEO GI sections, the requests with costs exceeding these limits may be accepted if the works are urgent, within the GEO GI or GS term contract scope, and the term contractor involved has spare capacity and can complete them within the time stipulated.

2. RESPONSIBILITIES OF GEO

- 2.1 GI, GS, and chemical and biological testing term contracts are managed by the Geotechnical Projects Division, and the Engineer for the Contract is the Chief Geotechnical Engineer/Geotechnical Projects (CGE/GP). Requests for them should be addressed to CGE/GP.
- 2.1 Soil and rock testing service contracts are managed by the Standards and Testing Division headed by CGE/Standards & Testing (CGE/S&T). Requests for soil and rock testing should be addressed to CGE/S&T (Attn: SGE/Lab) direct.
- 2.2 Funding for the requested GI/GS/LT services, in the form of an Allocation Warrant or Works Expenditure Authorization, should be sent to CGE/GP or CGE/S&T, as appropriate.
- 2.3 Engineer's Representatives (ERs) or Inspecting Officers (IOs) nominated by the corresponding CGE are normally Geotechnical Engineers/Engineers in the divisions. Several ERs/IOs may be nominated under a term/service contract. An ER/IO is responsible for the following aspects of contract administration:
- (a) Producing initial cost estimates for investigation/testing requests,

- (b) Arranging and attending meetings (on site, if necessary) with clients/consultants and term/service contractors, and subsequently producing final cost estimates,
 - (c) Planning and allocating the contractor's resources to meet clients' requirements,
 - (d) Issuing Works Orders/Service Orders (WO/SO) to the term/service contractors,
 - (e) Conducting periodic site or laboratory visits to ensure that the Contract Specification is followed and a good standard of workmanship, safety and environmental awareness is maintained,
 - (f) Issuing site instructions to the term contractors,
 - (g) Monitoring the works progress,
 - (h) Checking the quality of preliminary records and Final Field Work or Laboratory Testing Reports,
 - (i) Checking and certifying completion of WO/SO and payment for the works/service,
 - (j) Issuing variation orders, valuing variations, settling claims and imposing liquidated damages, if appropriate, and
 - (k) Reporting on the contractor's performance.
- 2.4 Under the Land (Miscellaneous Provisions) Ordinance effective since 1 April 2004, CEDD is the Permittee under Excavation Permits (XPs) issued by Highways Department (HyD), while the GI contractor becomes the Nominated Permittee. For XPs issued by Lands Department, the term contractor becomes the Permittee. The Permittee and Nominated Permittee are responsible for complying with their respective permit conditions. Upon completion of the required processes for XP application by the client/consultant (see Section 3.1.2(e)), GEO will sign and submit the XP application to HyD, settle the payment for prescribed XP fee, provide the XP conditions to the Nominated Permittee, and report notification of commencement/completion of works.
- 2.5 The GEO GI term contractors will not undertake excavation works that are solely for the purpose of locating public utilities.

3. RESPONSIBILITIES OF THE CLIENT/CONSULTANT

3.1 Ground Investigation and Geophysical Survey

- 3.1.1 The purpose of the GI/GS, locations of previous investigation stations, estimated drillhole depths, strata/layer thickness and requirements for drilling, sampling, field-testing and instrumentation should be provided in each GI/GS request, as appropriate. Three prints and a copy negative (for A2 and larger size only) of a drawing, and photographs showing the investigation station locations/areas should also accompany the request. Co-ordinates of each investigation station should be provided where setting out by survey is required (which should be requested when the GI submission is first made).
- 3.1.2 Before the issuance of a GI/GS works order, the following items should be completed unless otherwise agreed with the ER beforehand:

- (a) All land matters including XP applications and compensation issues, must be resolved by the client/consultant. Written confirmation that access permission has been given by the relevant Government Departments, statutory authorities, maintenance parties, owners and/or occupiers to enter the site and to carry out the works must be provided.
 - (b) A meeting should be held jointly between the client/consultant, GEO and the term contractor to confirm the locations of the investigation stations and also the form of access where necessary.
 - (c) The details and locations of any drainage, services and utilities in the vicinity of the investigation stations must be provided by the client/consultant (see Appendix 1), and forwarded to GEO prior to the meeting if possible. The client/consultant should ensure that the date of providing details and locations by utility undertaker from a works order commencement date should not be more than 3 months for electricity supply lines and gas mains, and 6 months for other drainage, services and utilities. In case of the elapse of the 3 or 6 months periods, the client/consultant is required to re-obtain the relevant utilities and re-provide them to GEO before the issue of works order.
 - (d) For sites falling within the MTRC or any tunnel/cable protection zones, or drainage or waterworks reserves, permission of the relevant parties to carry out the GI works and the extent of the relevant protection zones must be obtained by the client/consultant.
 - (e) For sites where XP is required, the client/consultant is responsible for the overall process for obtaining the XP. Their responsibilities include but not limited to plan pre-registration and registration, permit period assessment, case coordination, submission of and coordination for traffic proposals, application for XP extension. The GI contractor will provide the Lighting, Signing Guarding (LSG) or Temporary Traffic Management (TTM) proposals to the client/consultant for their submission.
 - (f) The client/consultant should observe the requirements stipulated in the ETWB Technical Circular (Works) No. 18/2005 and GEO Circular No. 36 in respect of conflict of interest and debarring. They should inform GEO in writing if they have any conflict or potential conflict of interest with the contractor.
- 3.1.3 The sampling technique specified should provide sufficient quantities of materials and samples of adequate quality for laboratory testing, if required. The geotechnical parameters to be derived by the GI should preferably be mentioned in the GI request.
- 3.1.4 Any monitoring works required after the installation of piezometers and other instruments carried out under the GI term contracts, must be separately arranged by the client/consultant.
- 3.1.5 The client/consultant should give an advance notice of the required GI/GS/LT to CGE/GP and/or CGE/S&T for their resources planning. The project programme shall allow time for resolving the matters in paragraph 3.1.2 (a) to (e) above, and for commencement and completion of the GI/GS/LT works.

3.2 Soil and Rock Testing

- 3.2.1 The client/consultant should provide detailed requirements for laboratory testing using the blank schedule in Appendix 2, as early as possible. In case of doubt or difficulty in preparing the laboratory testing schedule, the client/consultant should seek clarification and advice from CGE/S&T as soon as possible.
- 3.2.2 The standard test methods given in GEOSPEC 3 “Model Specification for Soil Testing” should be adopted. The test method number should be specified where more than one option is available for a particular test (e.g. moisture content determination at 45°C or 105°C; particle size distribution determination by wet sieving with or without the use of dispersant). For triaxial and direct shear tests, the required moisture content determination test method number should also be specified. Guidance on the minimum mass of soil required for testing of disturbed samples is given in Appendix 3.
- 3.2.3 Specification of the type of classification tests for saprolitic, residual and colluvial soils should follow the guidelines in GEOSPEC 3.
- 3.2.4 For compaction tests on saprolitic, residual and colluvial soils, the materials should be assumed to be susceptible to crushing unless it can be shown otherwise.
- 3.2.5 The tests will usually be carried out in a service contract laboratory. However, some testing may be carried out at the Public Works Central Laboratory (PWCL).
- 3.2.6 For ‘special’ tests (i.e. tests not included in the contract Specification), a detailed test specification, which should contain the standard test method (where available) or the key test procedures, and the calibration procedures (where appropriate), should be provided with the testing schedule. Tests on dummy samples may need to be specified to check if the test specification can be followed.
- 3.2.7 Contractors to undertake the Standards and Testing Division’s soil and rock laboratory testing service contracts are selected from the DEVB List of Specialist Contractors for Public Works for Soil and Rock Testing. The list is not set up for selection of contractors to carry out any contamination tests, e.g. tests on heavy metals, hydrocarbon, dioxin, etc. For chemical and biological tests, please refer to Section 3.3. Tests for land contamination may be procured separately either by the client or through GEO service contracts. CGE/GP should be advised of the laboratory appointed to carry out these tests before or immediately after commencement of the GI works if the GI works are carried out by Geotechnical Projects Division's GI term contractors to ensure timely delivery of samples for testing.

3.3 Chemical and Biological Testing

- 3.3.1 The parameters to be determined and reporting limits of the chemical and biological tests on marine sediment are specified in ETWB TCW No. 34/2002 – Management of Dredged/Excavated Sediment. The chemicals of concern (COC) to be determined for soil and groundwater from contaminated land are extracted from the Guidance Manual for Use of Risk-Based Remediation Goals for Contaminated Land Management published by the EPD. The client/consultant is expected to be familiar with the requirements of the technical circular and the guidance note before submitting a request to CGE/GP.

3.4 Contractor's Working Hours

- 3.4.1 The working hours of the GI, soil and rock testing, and chemical and biological testing term contractors/service contract laboratories under the Contract are 7 a.m. to 7 p.m., Monday to Saturday (excluding public holidays). The client/consultant should make arrangements for effective liaison with the term contractors/service contract laboratories to ensure that unwarranted standing time payments will not be incurred.

3.5 Professional and Technical Supervision

- 3.5.1 Technical supervision of GI/GS should be provided by the client/consultant. According to WBTC No. 13/90 and Geoguide 2 "Guide to Site Investigation", GI/GS should normally be supervised full-time by experienced technical personnel and part-time by a suitably qualified and experienced engineer or geologist. These requirements are the minimum considered necessary except for small scale, simple GI field works. In certain cases, more stringent supervision may be appropriate and will be recommended by the ER. For large scale GI works (i.e. value exceeding \$2M for land-GI and \$3M for marine-GI), the client/consultant's technical supervisor on site should complete the Site Diary everyday and the client/consultant's professional supervisor should vet the Site Diary when technical supervision is provided.
- 3.5.2 The client/consultant should also provide an appropriate level of supervision for laboratory testing. Supervision by experienced personnel is necessary for chemical and biological testing of sediment, soil and groundwater from contaminated land. Supervision by experienced geotechnical personnel is particularly important for the triaxial and direct shear strength tests, as well as oedometer tests. The client/consultant should arrange for supervision of all tests, except for the simple classification and compaction tests. The materials scheduled for testing should be examined to confirm that they are as originally anticipated, and that they are representative and suitable for testing. This examination can only be done at the laboratory on extrusion of the samples from the sampling tubes.
- 3.5.3 The details of the personnel proposed to supervise land and marine-GI, GS and LT should be submitted to the ERs of the respective contracts according to Paragraphs 2.1 and 2.2 above. The client/consultant will be notified by the ER if the proposed supervision is considered inadequate.
- 3.5.4 The client/consultant is responsible for the technical supervision of fieldwork, and verification of reinstatement and daily cleaning/weekly tidying works associated with the GI/GS on site and testing in the laboratory to ensure that the scope of the works, the methods used and the standard of workmanship comply with their requirements and Specifications of the GEO term contracts. This includes verifying the final depth of drillholes. Any deficiency should be reported to the ER. The contract Specifications for all land and marine GI contracts, together with soil and rock testing service contracts, can be found at the Environment, Transportation and Works Bureau portal under the Procurement & Costing pull-down manual or accessed at this link <http://portal.etwgi.etwb.hksarg/>.

3.5.5 Staff deployed for site supervision should be fully conversant with the requirements of the project, the standard of workmanship required, the contract Specifications and the procedures in this Note, so that effective and timely decisions can be made on site or at the laboratory (after consultation with the designer/project engineer where necessary). The site supervisory staff should confirm this point to GEO in writing prior to the commencement of works on site (see example in Appendix 4). The performance of these staff should be monitored by the client/consultant. The client/consultant should ensure that the proposed full-time technical personnel for GI/GS works under a WO would not be engaged in supervision at other sites during the fieldwork period of the WO. All staff members attending site should be properly trained in construction site safety and should be provided with appropriate personal protective equipment.

3.6 Excavation Permit Application, Co-ordination and Monitoring

3.6.1 Under the Land (Miscellaneous Provisions) Ordinance, CEDD is the Permittee for excavation to be carried out on streets including roadside slopes maintained by HyD. The client/consultant should liaise with the ER in advance on the requirements of excavation permits (XP) and the implication on the programme of the GI works.

3.6.2 The client/consultant is responsible for the overall administrative work, including funding arrangement, and provision of the required information for XP applications and any co-ordination and liaison with other parties, e.g. other XP applicants planning to carry out excavations in the vicinity.

3.6.3 CGE/GP and his staff have overall responsibility for ensuring compliance with the XP Conditions. Requirements for compliance are stringent and are policed by HyD Audit Teams. Non-compliances may be investigated by HyD's Enforcement Section and reported to SDEV.

3.6.4 For GI works on unleased land (other than streets maintained by HyD), clients/consultants are advised to obtain a "simplified temporary land allocation" from the relevant DLO to cover the site(s) and apply for any extensions required on the advice of ERs. Otherwise, the client/consultant shall apply for an XP to be issued by DLO. For minor works not requiring lateral support (drillholes, slope stripping and trial pits $\leq 1.2\text{m}$ deep), exemption from these requirements may be granted by CGE/GP under the provisions of the Ordinance provided that DLO has expressed no objection to the GI works.

4. ISSUE OF WORKS ORDERS/SERVICES ORDERS

4.1 After receipt of all information, the ER/IO will send a draft WO/SO to the client and his consultant (if one has been appointed) for comment. When comments are received, the availability of funds is confirmed and the actions listed under para. 3.1.2 are completed, the WO/SO will be issued. The fieldwork or laboratory testing commencement date will be decided by the ER/IO. A copy of the WO/SO issued will be forwarded to the client/consultant.

4.2 For soil and rock testing carried out at the PWCL, a SO will not be issued as no payment is involved, and the PWCL will liaise directly with the client/consultant.

5. INSTRUCTIONS UNDER THE CONTRACT

- 5.1 All instructions to the term/service contractors should be made through the ER/IO except for minor items of works/service (see 5.2). The ER/IO's instructions are made in the form of a Site Instruction or Variation Order to the WO/SO (or in some cases, a separate WO/SO). For proper accounting and execution of the Contract, all instructions (or changes to instructions) to the term/service contractors should be given in writing.
- 5.2 Requests may be given directly to the term/service contractors by the client/consultant's representative on site for minor variations in the specification of works/service which are covered by the original WO/SO, e.g. amending depths of sampling, drillholes and piezometer tips, confining pressure in laboratory testing, etc. Requests of this nature should be recorded in the Site/Laboratory Log Book, which must be signed by the client/consultant's supervisory staff at the time of request, with the WO/SO No. indicated. The contractor is instructed not to follow any verbal instructions from the client/consultant on even minor variations in the specification of works as above unless the instructions are confirmed in the Site/Laboratory Log Book. For major variations to the works/service, i.e. those that significantly increase or decrease the value of a WO/SO, the ER/IO must always be consulted.
- 5.3 Where it is necessary to issue a request outside the GEO's office hours (which are 8:30 a.m. to 5:45 p.m. Monday to Friday excluding General Holidays, but not involving major change to the works/service, the ER/IO should be informed as early as possible on the next working day.
- 5.4 The Site and Laboratory Log Books must be signed by all visitors to the site or laboratory regardless of whether any amendments to the WO/SO are requested. The time of arrival and departure of the supervising staff from the client/consultant should also be recorded.

6. SUBMISSION OF PRELIMINARY RECORDS AND FINAL REPORTS

6.1 Ground Investigation and Geophysical Survey

- 6.1.1 The term contract specification stipulates the following time limits for the submission of preliminary records/reports and Final Field Work Reports:
- (a) For land-GI and marine-GI, the contractor is required to submit preliminary drillhole, trial pit, trial trench, corehole, vibrocore, and slope stripping records and field test results (excluding SPTs) within six working days of the completion of the investigation station or test to which the records refer. Ground levels and coordinates of drillholes and vibrocores are also available within similar time after completion of all the fieldwork upon request. For geophysical surveys, the contractor is required to submit a preliminary report within 18 working days of completion of the fieldwork, except for echo sounding on its own, water sampling or grab sampling, for which preliminary reports are not required.
- (b) The Engineer or his representative is required to provide comments to the contractor on all preliminary land-GI or marine-GI records or the preliminary geophysical survey reports, if any, within ten working days of the receipt of the preliminary records/reports. Hence the client/consultant should provide comments on the records/reports received in accordance with the time frame stipulated in Paragraph 6.1.2 below.

- (c) The contractor is required to submit the Final Field Work Report within the periods below, following the receipt of all comments on the preliminary records:

Land-GI	
GCO probes or geophysical testing only	6 working days
Land-GI and Marine-GI	
up to 5 investigation stations	6 working days
6 – 20 investigation stations	12 working days
over 20 investigation stations	18 working days
Geophysical Survey	
Final reports (echo sounding survey on its own, water sampling or grab sampling)	12 working days of completion of field work
Others	6 working days
Where additional drillhole records for interpretation of survey results are provided with comments	12 working days

- 6.1.2 The client/consultant should ensure that comments on preliminary GI records or geophysical survey reports are forwarded to the ER within **seven** working days of receipt of each set of records/report. If there is no comment, the client/consultant should also confirm this in writing. If further time is required for comment, the ER should be informed as soon as possible and within the prescribed period. Otherwise, the ER would assume that there is no comment.
- 6.1.3 When commenting on the preliminary drillhole/vibrocore records, the client/consultant should note that the contractor is required to follow Geoguide 3 "Guide to Rock and Soil Descriptions" and the "Required Presentation of Information" (refer to the relevant contract Specification, see para. 3.5.4). The client/consultant's supervisory staff should check and confirm the accuracy of the records produced.
- 6.1.4 Delays in the submission of comments on the preliminary records/reports may result in a legitimate claim for an extension of time by the contractor, and a delay in the submission of the Final Field Work Report.

6.2 Soil and Rock Testing

- 6.2.1 One hard copy and one CD-ROM copy of the Final Laboratory Testing Report will normally be provided to the client/consultant. If additional copies are required, the client/consultant should request this when the testing schedule is submitted to CGE/S&T(Attn: SGE/Lab).
- 6.2.2 There are no set reporting times stipulated in the Contract, but preliminary results can be provided by the contractor to a named person by fax or e-mail on a weekly or bi-weekly basis if the client/consultant requests this in writing. The contractor is required to submit the Final Laboratory Testing Report to CGE/S&T (Attn: SGE/Lab) on or before the completion date stated on the WO/SO. In the case of tests carried out by PWCL, the Final Laboratory Testing Report will be issued to the client/consultant on or before the estimated completion date previously advised by PWCL.
- 6.2.3 The client/consultant should check the accuracy of the specimen descriptions for soil consolidation and strength tests to ensure that relevant observations are reported. It

should be noted that the specimen descriptions may differ from the sample descriptions in the GI Final Field Work Report, which are normally based on inspections at the ends of tube samples.

6.3 Chemical and Biological Testing

- 6.3.1 Depending on the number of samples to be tested, draft chemical testing report will normally be provided to the client/consultant within two weeks upon receipt of the last batch of samples by the laboratory. Draft biological testing report will be provided within 45 days of issue of an instruction to begin the biological tests by the client/consultant. Two copies of the final chemical and biological testing report will be provided to the client/consultant within 21 days upon receipt of comments on the draft reports from the client/consultant.
- 6.3.2 Draft programme for testing and reporting will be provided to the client/consultant for comments before the issuance of a chemical and biological testing WO. The client/consultant should plan in advance and coordinate with the GI/GS contractors, relevant approving authorities (e.g. EPD) and GEO/laboratory to ensure that the testing meets their project programmes and the test requirements specified by the relevant authorities.

7. FEEDBACK

The client/consultant will be asked to complete and return a Performance Appraisal form (provided separately on completion of a WO/SO) to the ER/IO. Other feedback on the performance of the term/service contractors is welcome. Feedback should be directed to CGE/GP or CGE/S&T, as appropriate.

APPENDIX 1

Checklist for Utilities and Underground Structures Checking for GI Works

Project: _____

GEO Ground Investigation Works Order No: _____

	Plans provided to GEO	Date of reply from utility authorities	Plans not available with remarks
Drainage Services Department	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
Water Supplies Department	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
Transport Department	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
Public Lighting	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
CLP Power/Hong Kong Electric	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
HK & China Gas	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
PCCW	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
Wharf New T & T	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
HK Cable TV	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
Hutchison Global Crossing	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
New World Telephone	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
HK Broadband Network	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
Underground Structures (underpass/tunnel)	<input type="checkbox"/>	_____	<input type="checkbox"/> _____
Others : _____	<input type="checkbox"/>		

I confirm that utilities search is comprehensive and that all relevant plans (2 copies) are transmitted herewith.

Signed : _____ Post : _____ Date : _____

(Name : _____)

Consultant Firm / Department: _____

APPENDIX 3

Minimum Mass of Soil Required for Testing of Disturbed Samples

Type of Test	Test Method Description	Test No.	Soil Grouping		
		GEOSPEC 3	Fine-grained Soils	Medium-grained Soils	Coarse-grained Soils
Moisture content	Determination of Moisture Content by Oven-Drying at 105 C ± 5 C	5.2			
	Determination of Moisture Content by Oven-Drying at 45 C ± 5 C	5.1	50 g	350 g	4 kg
	Comparative Test for the Determination of Moisture Content by Oven-Drying	5.3			
Liquid and Plastic Limits	Determination of Liquid Limit, Plastic Limit and Plasticity Index	6.1	550 g	1.1 kg	2.2 kg
Particle size distribution (wet sieving)	Determination of Particle Size Distribution by Wet Sieving (with Dispersant)	8.1			
	Determination of Particle Size Distribution by Wet Sieving (without Dispersant)	8.2	150 g	2.5 kg	17 kg
Particle size distribution (sedimentation)	Determination of Particle Size Distribution by Pipette Method (with Dispersant)	8.3			
	Determination of Particle Size Distribution by Pipette Method (without Dispersant)	8.4	100 g	100 g+	100 g+
	Determination of Particle Size Distribution by Hydrometer Method (with Dispersant)	8.5			
	Determination of Particle Size Distribution by Hydrometer Method (without Dispersant)	8.6	250 g	250 g+	250 g+
Compaction	Determination of the Dry Density/ Moisture Content Relationship of Soils Containing Particles Which are Not Susceptible to Crushing (Using a 1000 cc Mould and 2.5/4.5 kg Rammer)	10.1/10.5	10 kg	10 kg	10 kg
	Determination of the Dry Density/ Moisture Content Relationship of Soils Containing Particles Which are Susceptible to Crushing (Using a 1000 cc Mould and 2.5/4.5 kg Rammer)	10.2/10.6	25 kg	25 kg	25 kg
	Determination of the Dry Density/ Moisture Content Relationship of Soils Containing Particles Which are Not Susceptible to Crushing (Using a CBR Mould and 2.5/4.5 kg Rammer)	10.3/10.7	50 kg	50 kg	50 kg
	Determination of the Dry Density/ Moisture Content Relationship of Soils Containing Particles Which are Susceptible to Crushing (Using a CBR Mould and 2.5/4.5 kg Rammer)	10.4/10.8	80 kg	80 kg	80 kg

+ Sufficient to give the stated mass of fine-grained material

Notes:

- The group of soils, as defined below, is based on GEOSPEC 3 Clause 1.2.
 Fine-grained soils are those with particles not larger than 20 mm and not more than 10% by weight retained on a 2 mm test sieve.
 Medium-grained soils are those with particles not larger than 37.5 mm, more than 10% by weight retained on a 2 mm test sieve but not more than 10% by weight retained on a 20 mm test sieve.
 Coarse-grained soils are those with more than 10% by weight retained on a 20 mm test sieve but not more than 10% by weight retained on a 37.5 mm test sieve.
- The actual mass of sample required shall be assessed by multiplying the mass given above (which includes some allowance for drying, wastage and rejection of stones where required) by the number of test determinations to be carried out. Where the total mass of sample so calculated is less than the minimum mass given below for the appropriate soil group, then that minimum mass should be taken to ensure the sample is representative:

<u>Soil Grouping</u>	<u>Minimum Mass</u>
fine-grained soils	0.5 kg
medium-grained soils	5 kg
coarse-grained soils	30 kg

