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Our Ref: **APPBCA-2025-16**

1 Sep 2025

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Building Engineering Group (#12-01)
Tel: 1800 3425 222 (1800-DIAL-BCA)
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https://www.bca.gov.sg/feedbackform/

Dear Sir/Madam

GUIDELINE ON REQUIREMENTS FOR SITE INVESTIGATION REPORTS

Objective

This guideline aims to inform the industry on the requirements for the preparation of Site Investigation (SI) reports that are submitted to BCA for building works.

Background

2. In 2013, BCA introduced the submission of SI data via the AGS(SG) format. The SI reports submitted were however highly varied in terms of reporting format and completeness. There is therefore the need to standardise the quality of SI reports so that the Qualified Persons ('QPs') or Engineers will be able to assess the ground conditions reliably and for the safe and economical design of building works.

Site Investigation Based on Eurocode 7

3. Eurocode 7 requires designers to be responsible for the planning of the geotechnical investigation and conduct of the necessary field and laboratory tests to gather geotechnical data. Reference can be made to Geotechnical Society of Singapore ('GeoSS') 'Guide on Ground Investigation and Geotechnical Characteristic Values to Eurocode 7' for more detail.

4. As per SS EN 1997-2:2007 CL2.2 (2)P, a desk study is recommended as the first step of the investigation process. The following key resources which provide subsurface geological information can be used for SI planning:

(i) Singapore Geological Maps and Memoir (BCA, 2021); and
(ii) Existing borehole data for public access via INLIS [https://app.sla.gov.sg/inlis/#/home]

5. This guideline comprises (i) **Annex A,** which outlines minimum requirements; (ii) **Annex B**, **C** and **D,** which details good practices for SI report preparation, borehole logs, and shear wave velocity test report/ geophysical survey report respectively; and (iii) **Annex E** which provides clarity to GEOL_GEO2 material code, and the field guide for soil and rock.

6. This circular is for compliance by QPs appointed to prepare plans for building works and SI firms accredited by Singapore Accreditation Council ('SAC'). It will take effect for:

(i) New project applications submitted to the Urban Redevelopment Authority (URA) for Planning Permission (PP) on or after **1 March 2026**; **and**
(ii) SI reports dated on or after **1 March 2026**.

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7. Developers should engage their QPs or consultants early so that the selection of appropriate site investigation methods and tests can be jointly determined within the SI contract.

8. Notwithstanding this circular, all QPs must continue to exercise their engineering judgment and evaluation, taking all reasonable steps and due diligence to ensure that the site investigation will fulfil the objectives and performance requirements stipulated in the relevant regulations. Where applicable, QPs are expected to incorporate more stringent and/or additional requirements as required by the project or when the ground conditions are highly variable and geologically complex.

9. If you need any clarification, please contact us at Tel: 1800 3425 222 or submit your enquiry through BCA's Online Feedback Form at https://www.bca.gov.sg/feedbackform/. Thank you.

Yours faithfully

Er. Kong Tze Foong
DIRECTOR
BUILDING ENGINEERING GROUP
for COMMISSIONER OF BUILDING CONTROL

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GUIDELINES ON REQUIREMENTS FOR SITE INVESTIGATION REPORTS

ANNEX A – MINIMUM REQUIREMENTS FOR SITE INVESTIGATION REPORTS

A.1 The minimum requirements as listed in **Table A** are mandatory when making Building Work submissions.

Table A: Minimum Requirements for SI report submission

Item	Subject	Description / Requirement
A.1	Format of SI report	<u>For (a) standalone SI report or (b) SI report combined with Shear Wave Velocity Test Report/ Geophysical Survey Report,</u> Submit: (i) as a standalone report [1] in PDF format using the naming convention (SGO_SI_xxxx.pdf) **and**; (ii) in AGS(SG) format using the naming convention (SGO_SI_xxxx.ags). <u>For standalone Shear Wave Velocity Test Report/ Geophysical Survey Report (if any),</u> Submit: (i) as a standalone report [1] in PDF format using the naming convention (SGO_SIGP_xxxx.pdf). *[1] The SI report is not to be renamed or combined into the QP's design report.*
A.2	Certification by an appropriate Professional Engineer	Include certification by an appropriate Professional Engineer, verifying the accuracy of the information provided in the SI report.

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		https://go.gov.sg/qpsireport Appendix A – **QP endorsement for SI report** 1. I, _____ the Professional Engineer, PE Registration No. _____ certify that the Site Investigation Report [Report title & site address] _____ 2. comprising all field and laboratory data, tests and results therein has been carried out by me or under my supervision or direction, and I have verified the accuracy of the information given in the site investigation report, and to the best of my knowledge and belief, all have been prepared in compliance in all respects with the provisions of the Building Control Act and Regulations, relevant Codes of Practice and Standards. 3. I further certify that I have the appropriate qualifications and experience, and I am familiar with the purpose of the investigation for which this Site Investigation Report is prepared in reference to Project Ref. No: _____ 4. Total number of pages in the Site Investigation Report is _____ _____ _____ Professional Engineer for Site Investigation Signature and Stamp Date
A.3	Stratum Descriptions and Material code	(i) Adopt the geological stratigraphic code (GEOL_GEO3) in accordance with the new stratigraphical framework of Singapore, as specified in the 'Guidelines for Electronic Transfer of Site Investigation Data (Edition 3.0)'. This applies to both the borehole logs and AGS(SG) electronic format submissions. (ii) Use EC7 compliant material codes (GEOL_GEO2) to replace current Singapore material code. Refer to **Table E.1** in **Annex E.**
A.4	As-built borehole location plan and summary table of boreholes	Submit the following: (i) As-built borehole location plan, including: (a) Borehole locations with ID numbers; (b) Site boundary (if applicable); (c) Topographical features (optional). (ii) Coloured Singapore Geological Map (BCA, 2021) showing: (a) Site boundary (if applicable); (b) Borehole locations.

<table>
<tr>
<td></td>
<td></td>
<td>
(iii) As-built borehole information table containing:

(a) Borehole coordinates [2] in SVY21 format (to 3 decimal places);

(b) Borehole ground level in Singapore Height Datum (SHD) [3] (to 3 decimal places);

(c) Borehole termination depth (to 2 decimal places).

[2] The Northing and Easting coordinates are to be checked for correctness and not swapped.
[3] For marine boreholes, the ground level in the AGS(SG) and borehole logs are to be submitted in SHD. The ground level in chart datum is to be included in the as-built borehole information table. See Table A.2.

Table A.1: Example of As-built borehole information table for land boreholes

<table>
<tr><th rowspan="2">ID</th><th colspan="2">Coordinate</th><th rowspan="2">Ground Level (mSHD)</th><th rowspan="2">Terminated depth (m)</th></tr>
<tr><th>Northing</th><th>Easting</th></tr>
<tr><td>BH 1</td><td>00000.000</td><td>00000.000</td><td>00.000</td><td>00.00</td></tr>
<tr><td>BH 2</td><td>00000.000</td><td>00000.000</td><td>00.000</td><td>00.00</td></tr>
<tr><td>BH 3</td><td>00000.000</td><td>00000.000</td><td>00.000</td><td>00.00</td></tr>
</table>

Table A.2: Example of As-built borehole information table for marine boreholes

<table>
<tr><th rowspan="2">ID</th><th colspan="2">Coordinate</th><th rowspan="2">Ground Level (mSHD)</th><th rowspan="2">Ground Level (mCD)</th><th rowspan="2">Terminated depth (m)</th></tr>
<tr><th>Northing</th><th>Easting</th></tr>
<tr><td>BH 1</td><td>00000.000</td><td>00000.000</td><td>00.000</td><td>00.000</td><td>00.00</td></tr>
<tr><td>BH 2</td><td>00000.000</td><td>00000.000</td><td>00.000</td><td>00.000</td><td>00.00</td></tr>
<tr><td>BH 3</td><td>00000.000</td><td>00000.000</td><td>00.000</td><td>00.000</td><td>00.00</td></tr>
</table>
</td>
</tr>
<tr>
<td>A.5</td>
<td>Field, laboratory data, tests and results</td>
<td>
Submit the following in the SI report as substantiation for the parameters proposed for adoption:

(i) Field and laboratory test results, including:

(a) Test results presented and reported according to applicable EN/BS standards or other relevant standards/methods;

(b) Certification and calibration documentation for both field and laboratory equipment;

(c) Tabulated quantities of field and laboratory work completed;
</td>
</tr>
</table>

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		(d) Names and signatures of the responsible field and laboratory personnel; (e) All laboratory test reports shall be prepared by laboratories accredited [4] by SAC. *[4] For specialised tests not on the schedule of soil and rock testing accredited by SAC, laboratories or institutions, both local and overseas with recognised accreditation or in-house testing capabilities, subjected to the acceptance of the QP, may be engaged for the required testing.*
A.6	SPT hammer calibration certificates	Submit the calibration certificate for each SPT hammer used. The SPT energy ratio (E_r) is to be reported in the borehole log.

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GUIDELINES ON REQUIREMENTS FOR SITE INVESTIGATION REPORTS

ANNEX B – GOOD PRACTICES FOR SITE INVESTIGATION REPORTS

B.1 SI Report Format

The SI report is to be prepared in accordance with the requirements of BS5930:2015+A1:2020 and SAC Technical Note SI 01: SPECIFIC REQUIREMENTS FOR THE ACCREDITATION OF INSPECTION BODIES FOR SITE INVESTIGATION. The sequences and format, as detailed in **Table B,** should also be followed.

Table B: Sequence and Format of SI Report

Item	Subject	Description/ Requirement
B.1 Cover Page		
B.1.1	Report identification number	The unique identification number of the report based on SI firm's in-house practice.
B.1.2	Report title	(i) Title of the project for which the site investigation was conducted; (ii) Location of the site.
B.1.3	Report date	Date of report issuance.
B.1.4	SI firm	Name of the firm.
B.2 PE's Certification in SI Report		
B.2.1	Certification by an appropriate Professional Engineer	See item **A.2** in **Annex A.**
B.3 Introduction		
B.3.1	Project Description	The Project description should include: (i) Title of the project; (ii) Client; (iii) Site investigation main contractor and subcontractor; (iv) Soil and rock testing laboratory; (v) Duration of the fieldwork; (vi) The purpose and scope of the SI work.

B.3.2	As-built borehole location plan and summary table of boreholes	See item **A.4** in **Annex A**
B.3.3	Geological cross section and/or probable soil profile (if applicable)	Include the geological cross sections in graphical format.
B.3.4	Site geology (optional)	Provide a summary of the site geology and ground conditions with reference to the Singapore Geological Map and Memoir (BCA, 2021) and other available information. The summary should highlight any complex or variable ground conditions that is expected to be encountered, such as limestone cavities, slump zones, boulders, faults, and any other significant geological features.
B.4 Borehole logs (See item in **Annex C)**		
B.5 Field/ laboratory test results		
B.5.1	Field, laboratory data, tests and results	See item **A.5** in **Annex A**
B.5.2	Sample documentation and preparation for laboratory testing	(i) All rock and soil samples selected for laboratory testing shall be properly documented, described, and prepared to ensure reliable and relevant results. The following shall be recorded and carried out: (a) Record the sample type, depth, and percentage of sample recovery (e.g., thin wall sampler, piston sampler, coring); (b) Provide a visual description of the sample, including the lithology, degree of weathering, colour, and structural features such as foliations, joints, beddings, and any other notable geological characteristics (e.g., hydrothermal alteration) which may influence the test results [5]; (c) Include photo records of the cores, samples, and test specimens for the report (before and after testing, showing the failure mechanism, etc);

		(d) Determine and document the orientation of specimens before testing, especially for directional-sensitive tests (e.g., uniaxial compressive strength, point load, direct shear, etc.); (ii) Sample preparation methods as specified in BS 5930:2015+A1:2020 (Tables 37-40). *[5] The presence of boulders or corestones may affect the test results.*
B.6	Rock core photos	(i) Photo Quality: (a) Use digital colour photos; (b) Position the camera perpendicularly to the cores; (c) Use a white or light background; (d) Include an Original Standard Colour Calibration Chart (e.g., Kodak Colour Chart, X-rite ColourChecker, DGK Colour Tools); (e) Show a graduated scale in centimetres; (f) Avoid any reflections, shadows and distortions; (g) Moisten the rock core surface uniformly prior to taking the photo; (h) Photo should be taken before the core samples are extracted for testing. (ii) Core box labelling: (a) Project title; (b) Borehole ID & box number; (c) Date; (d) Depth of core runs; (e) TCR, SCR, RQD for each core run. (iii) Use stencilled lettering (avoid handwriting); (iv) Clearly mark all identified core loss zones and sample locations; (v) Indicate all mechanical fractures.

B.7	Calibration certification	Calibration certificates and reference numbers for test equipment in use. Types of tests and equipment [6] used: (i) Pressuremeter Test; (ii) Vane Shear Test; (iii) Plate Loading Test; (iv) Cone Penetration Test; (v) Dilatometer Test; (vi) Standard Penetration Test; (vii) Field Permeability Test (Packer Test). *[6] For more details, please refer to SAC Technical Note SI 01(Table 1).*
B.8	Shear Wave Velocity Test Report/ Geophysical Survey Report (if any)	See item in **Annex D**.
B.9	Borehole grouting documentation	Submit the documentation of the borehole grouting works as per the summary table. See **Table B.1**.

Table B.1: Example of borehole grouting

ID	Diameter (m)	Terminated depth (m)	Grout Mix Ratio by Weight (kg) Cement: Bentonite: Water			Date of Grouting	Recorded by (Name & Signature)	Remarks
			Cement	Bentonite	Water			
BH 1	*0.000*	*00.00*	*X*	*Y*	*Z*	*DD-MM-YYYY*	*Geologist Name & Signature*	*e.g., field observations*

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ANNEX C – GOOD PRACTICES FOR THE SEQUENCE AND FORMAT OF BOREHOLE LOGS

C.1 Borehole Log Format

The borehole log is to be prepared in accordance with the requirements of BS5930:2015+A1:2020 and SAC Technical Note SI 01: SPECIFIC REQUIREMENTS FOR THE ACCREDITATION OF INSPECTION BODIES FOR SITE INVESTIGATION. The sequences and formats, as detailed in **Table C**, should also be followed.

Table C: Sequence and Format of Borehole log

Item	Subject	Description / Requirement	
C.1	Borehole log information	Project information (i) Report identification number (see item **B.1.1** in **Annex B**); (ii) Title of the site investigation; (iii) Project client; (iv) SI firm; (v) Date of the fieldwork; (vi) Name of Driller/ Logger/ Checker; (vii) Borehole ID and sheet number (e.g., Sheet 2 of 2).	Borehole information (i) Location; (ii) Borehole ID; (iii) Northing (m) and Easting (m) (See item **A.4** in **Annex A**); (iv) Ground level (See item **A.4** in **Annex A**).
C.2	Description of the different soil/ rock layers	(i) Detailed information on any instrumentation installed (e.g., water standpipe or piezometer); (ii) Groundwater level (if measured); (iii) Borehole information to include TCR, SCR, RQD; (iv) Soil and rock description (See **Table C.1**); (v) Borehole termination depth (See item **A.4** in **Annex A**); (vi) Length of the core run.	

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C.3	Legend	(i)	Boring type;
		(ii)	Diameter of the borehole (external diameter of casing);
		(iii)	SPT hammer reference number and efficiency;
		(iv)	Any abbreviations used in borehole records.

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Table C.1: Soil and Rock Description.

Soil Description	**Rock Description**
Consistency/ Density	Rock strength [7] [8]
Colour	Colour
SOIL NAME *(Principal soil type and secondary constituents)*	ROCK NAME *(including grain size)*
Weathering grade [9]	Weathering grade [9]
Particle Shape and composition	Texture and fabric; structure
Structure	Discontinuities (if any) (e.g., Dip amount, spacing, roughness, slickensides.)
Geological Formation	Geological Formation
	Testing for the presence of carbonate (e.g., acid test).
Site observations	Site observations should include, but are not limited to: (i) Sudden drop of drill rods (to record the depth of drop); (ii) Loss of water and/or drilling fluid (to record the depth of water loss); (iii) Lack of return water; (iv) Changes in drilling rate; (v) Presence of voids, cavities, slump zones; (vi) Any other anomalies encountered during the drilling process.
Additional geological information. (e.g. composition, type of deposit, etc.)	Additional geological information. (e.g. mineral composition)
Critical laboratory test results: (i) Moisture content (ii) Bulk density (iii) Atterberg limits (liquid limit, plastic limit, plasticity index) (iv) Grain size analysis	Critical laboratory test results: (i) Unconfined Compressive Strength (UCS); (ii) Point Load Index (PLI)

[7] With reference to BS 5930:2015+A1:2020 (Table 40), characterising material properties of a rock sample using uniaxial compressive strength tests is to be carried out on **intact samples with no discontinuities**.

[8] Subject to the needs of the project, appropriate or additional tests should be specified to acquire accurate and representative data on the rock material and rock mass properties to provide valuable insights into rock mechanical behaviors and stability.

[9] The weathering grades of rock materials (I, II, III, IV, V, VI) from EN ISO 14689-1:2018 are to be adopted.

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GUIDELINE ON REQUIREMENTS FOR SITE INVESTIGATION REPORTS

ANNEX D – GOOD PRACTICES ON SHEAR WAVE VELOCITY TEST REPORT/GEOPHYSICAL SURVEY REPORT

D.1 Shear Wave Velocity Test Report/ Geophysical Survey Report

The Shear Wave Velocity Test Report/Geophysical Survey Report is to be prepared in accordance with BS5930:2015+A1:2020 (Section 5: Geophysical field investigations) and ASTM D7400/D4428 (Seismic Testing), where applicable.

BCA may approach SI firms or geophysical survey firms directly for the raw data files.

Table D: Good Practices for Shear Wave Velocity Test Report/ Geophysical Survey Report

D.1 Cover Page		
D.1.1	Report title	(i) Title of the project which the geophysical survey/ test was conducted; (ii) Location of the site.
D.1.2	Type of survey/ test conducted	Specify the type of geophysical survey/ test conducted.
D.1.3	Report date	Date of report issuance.
D.1.4	Test provider	Name of the firm.
D.2 Introduction		
D.2.1	Project description	The project description should include: (i) Project information (project title, location, description); (ii) Main contractor and geophysical contractor; (iii) Date of report and test conducted; (iv) Personnel involved.
D.2.2	Executive summary	(i) Key findings; (ii) Recommendations; (iii) Overview of results;

D.2.3	Purpose and scope of works	(i)	Objectives of the geophysical survey/test (e.g., subsurface profiling, rockhead mapping, cavity detection, groundwater exploration);
		(ii)	Site geology;
		(iii)	Scope of work (e.g., survey layout, depth, resolution, test locations).
D.2.4	Survey methodology	(i)	Description of the geophysical method(s) chosen and its applicability (e.g., any reference standards, limitations, etc.);
		(ii)	Equipment specifications;
		(iii)	Data acquisition procedures.
D.3 Data			
D.3.1	Data processing	(i)	Processing workflow (Description of each processing stage);
		(ii)	Initial results (e.g., tabulated raw data of time, velocity and other relevant parameters).
D.3.2	Data interpretation	(i)	Interpreted results with graphical representations (e.g., 2D and 3D profiles);
		(ii)	Integration with other SI data (if applicable).
D.4 Result			
D.4.1	Technical results	(i)	Summary of interpreted geophysical data and observations;
		(ii)	Assessment of data quality and reliability (including confidence levels and technical limitations);
		(iii)	Correlation with geological conditions (e.g., subsurface profiling, identification of faults or fracture zones);
		(iv)	Recommendations for additional investigation (if required).
D.5 Appendix			
D.5.1	Site plan and test location map	Survey layout plan.	
D.5.2	Site photos (except for restricted areas)	Site conditions, test setup.	

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D.5.3	Appendices	(i) Processing logs; (ii) Additional plots (if required); (iii) Installation records (e.g., for downhole seismic testing): (a) PVC casing installation depth; (b) PVC casing installation date; (c) Grouting or backfill specifications (e.g., grout type and mix ratio, fine sand, etc.); (d) Time gap between grouting/backfilling of borehole and conduct of geophysical test.

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ANNEX E – MATERIAL CODE (GEOL_GEO2) AND FIELD GUIDE SHEET FOR SOIL AND ROCK

E.1 Material Code (GEOL_GEO2)

This section presents the EC7 compliant material code to be used in borehole logs and SI reports. These symbols supersede the current Singapore material codes.

Table E.1: Material code (GEOL_GEO2)

Abbreviation Description (ABBR_DESC)	ABBR_CODE (EXISTING)	ABBR_CODE (NEW)
Gravel	G	Gr
Clayey GRAVEL	GC	clGr
Silty GRAVEL	GM	siGr
Sandy GRAVEL	GS	saGr
Organic GRAVEL	GO	orGr
Peaty GRAVEL	GPt	ptGr
PEAT	Pt	Pt
Gravelly PEAT	PtG	grPt
Clayey PEAT	PtC	clPt
Silty PEAT	PtM	siPt
Sandy PEAT	PtS	saPt
Sand	S	Sa
Gravelly SAND	SG	grSa
Clayey SAND	SC	clSa
Silty SAND	SM	siSa
Peaty SAND	SPt	ptSa
Organic SAND	SO	orSa
Silt	M	Si
Gravelly SILT	MG	grSi
Sandy SILT	MS	saSi
Peaty SILT	MPt	ptSi
Organic SILT	MO	orSi
Clay	C	Cl
Gravelly CLAY	CG	grCl
Sandy CLAY	CS	saCl
Organic CLAY	CO	orCl
Top Soil		TSOL

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E.2 Field Guide Sheet

This field guide sheet provides standardised terminology for describing soil and rock in accordance with BS EN ISO standards. It ensures consistency in field logging and facilitates clear communication between field personnel and laboratory staff. Refer to **Table E.2** and **Table E.3**.

Table E.2 **Field Guide Sheet for SOIL**

SEQUENCE OF TERMS- Consistency/Density-Colour-Soil Name-Weathering Grade-Particle Shape/Composition-Structure-Geological Formation-Site Observations-Additional Geological Info

DENSITY FOR COARSE SOILS *BS 5930:2015+A1:2020 (tables 10 to 11)*

Density	SPT N-value (relative density)	Assessment of field density (excavation by spade or pick — only for observation pits or trenches)
Very loose	0 – 4	Very easy to excavate with a spade
Loose	4 – 10	Fairly easy to excavate with a spade or to penetrate with a crowbar
Medium dense	10 – 30	Difficult to excavate with a spade or to penetrate with a crowbar
Dense	30 – 50	Very difficult to penetrate with a crowbar. Requires a pick for excavation
Very dense	>50	Difficult to excavate with a pick

CONSISTENCY FOR FINE SOILS *BS 5930:2015+A1:2020(table 8)*

Consistency	Assessment of Consistency	SPT N-value
Very soft	Finger easily pushed in up to 25 mm. Exudes between fingers	0-2
Soft	Finger pushed in up to 10 mm. Moulded by light finger pressure	2-4
Firm	Thumb makes impression easily. Cannot be moulded by fingers, rolls in the hand to a 3 mm thick thread without breaking or crumbling	4-8
Stiff	Can be indented slightly by thumb. Crumbles in rolling a 3 mm thick thread, but can then be remoulded into a lump	8-15
Very Stiff	Can be indented by thumb nail. Cannot be moulded but crumbles under pressure	>15

COLOUR *BS EN ISO 14688-1-2018(table 5)*

Value	Light – Dark
Chroma	Reddish/ Pinkish/ Orangish/ Yellowish/ Brownish/ Greenish/ Bluish/ Greyish
Hue	Red/Pink/Orange/Yellow/Cream/Brown/Green/Blue/White/Grey/Black

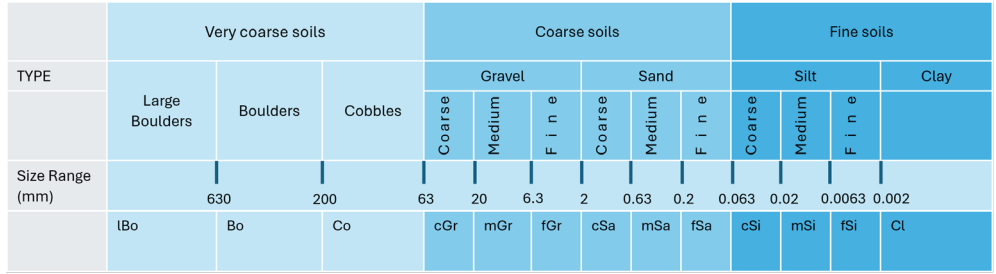
PARTICLE SHAPE/ COMPOSITION/STRUCTURE *BS 5930:2015+A1:2020(table7)*

Structure	Descriptive Term
Angularity/roundness	Very angular/ Angular/ Subangular/ Subrounded/ Rounded/ Well rounded
Form	Cubic/ Flat/ Elongate
Surface texture	Rough/ Smooth

GEOLOGICAL FORMATION-SITE OBSERVATIONS-ADDITIONAL GEOLOGICAL INFO

Record the geological name which indicates the geological origin or soil type. Refer to Singapore Geology (BCA,2021) for recording.

SOIL NAME *(Principal soil type and secondary constituents)* *BS 5930:2015+A1:2020(table7)*



BS 5930:2015+A1:2020(tables 12 to 17)

Principal Material	% Secondary	Description Format
Coarse Soil (>65% sand & gravel)	Up to 5%	Slightly [silty/clayey/sandy/gravelly] SAND/GRAVEL
	5–20%	[Silty/clayey/sandy/gravelly] SAND/GRAVEL
	>20%	Very [silty/clayey/sandy/gravelly] SAND/GRAVEL
	~50%	SAND and GRAVEL
Fine Soil (>35% silt & clay)	<35%	Slightly sandy/gravelly SILT/CLAY
	35–65%	Sandy/gravelly SILT/CLAY
	>65%	Very sandy/gravelly SILT/CLAY
Fine Soil with very coarse particles	Up to 5% boulders/cobbles	FINER SOIL with low boulder/cobble content
	5–20%	FINER SOIL with medium boulder/cobble content
	>20%	FINER SOIL with high boulder/cobble content
Very Coarse (>50% Boulders or Cobbles) >63 mm	Up to 5% finer material	BOULDERS/COBBLES with a little [finer material]
	5–20%	BOULDERS/COBBLES with some [finer material]
	20–50%	BOULDERS/COBBLES with much [finer material]
	>50% finer material	Switch: Finer material becomes principal, boulders/cobbles treated as inclusions
	Up to 5% cobbles or boulders	BOULDERS with occasional cobbles / COBBLES with occasional boulders
	5–20%	with some [other very coarse]
	20–50%	with many [other very coarse]

REMARK: *This field guide is intended for preliminary field logging purposes only. Field descriptions and assessments should be cross-checked with laboratory and in-situ test results.*

Table E.3 **Field Guide Sheet for ROCK**

SEQUENCE OF TERMS- Rock Strength-Colour-Rock Name-Weathering Grade-Texture-Discontinuities-Geological Formation-Carbonate Content-Site Observations-Additional Geological Info

ROCK STRENGTH *BS 5930:2015+A1:2020(table 25)*

Rock Strength	UCS(mPa)	Assessment of rock strength
Extremely Weak	0.6-1.0	Scratched by thumbnail, breaks in brittle manner, gravel sized lumps can be crushed between finger and thumb.
Very Weak	1-5	Scratched by thumbnail, lumps can be broken by heavy hand pressure, can be peeled easily by a pocketknife, hand-held specimen crumbles under firm blows with the point of a geological hammer
Weak	5-12.5	Thin slabs, corners or edges can be broken off with hand pressure, can be peeled by a pocketknife with difficulty, easily scratched by pocketknife, shallow indentations made in hand-held specimen by firm blow with the point of a geological hammer.
Moderately Weak	12.5-25	Thin slabs, corners or edges can be broken off with heavy hand pressure, can be scratched with difficulty by pocketknife, hand-held specimen can be broken with a single firm blow of a geological hammer
Medium Strong	25-50	Cannot be scraped with a pocketknife, specimen on a solid surface can be fractured with a single firm blow of a geological hammer.
Strong	50-100	Requires more than one blow of a geological hammer to fracture it.
Very Strong	100-250	Requires many blows of a geological hammer to fracture it.
Extremely Strong	>250	Can only be chipped with a geological hammer.

ROCK NAME

Igneous Rocks	Grain size	(Common types only)
Granitic-rock	Coarse (>2 mm)	Granite, granodiorite, tonalite, syenite, monzonite
Microgranitic-rock	Medium (0.25–2 mm)	Microgranite
Felsite	Fine (<0.25 mm)	Rhyolite, dacite, trachyite
Gabbroic-rock	Coarse (>2 mm)	Gabbro, diorite, monzogabbro, dolerite, norite
Microgabbroic-rock	Medium (0.25–2 mm)	Microgabbro, microdiorite
Mafite	Fine (<0.25 mm)	Basalt, andesite, phonolite, tephrite, foidite

Sedimentary Rocks	Grain size	(Common types only)
Mudstone	Fine (< 0.064 mm)	Claystone, siltstone
Sandstone	Coarse (0.064–2 mm)	Sandstone, greywacke, arenites
Conglomerate	Very coarse (> 16 mm)	Conglomerate, breccia, diamictite
Carbonate-rock	Variable (fine to coarse)	Limestone, dolostone, micrite, sparite, etc.

Classification and grain size references are based on Singapore Geological Practitioners Guide (BCA,2021) Figure 19, Figure 20 (BGS Grain Size Chart) , Singapore Geological memoir(BCA,2021) table 8.

TEXTURE *BS 5930:2015+A1:2020(Section 36.2.4)*

"porphyritic", "crystalline", "cryptocrystalline", "amorphous"," quenched"," triple-point"," granophyric "and "glassy"

WEATHERING GRADE *BS 5930:2015+A1:2020(figure 9)*

Weather Grade	Classifier	Typical characteristics
I	Fresh	Unchanged from original status
II	Slightly weathered	Slight discolouration, slight weakening
III	Moderately weathered	Considerable weakened, penetrative discolouration. Large pieces cannot be broken by hand
IV	Highly weathered	Large pieces can be broken by hand, does not readily disaggregate(slake)when dry sample immersed in water
V	Completely weathered	Considerable weakening. Slakes. Original texture apparent
VI	Residual soil	Soil derived in situ weathering but retaining none of the original texture or fabric

GEOLOGICAL FORMATION-SITE OBSERVATIONS-ADDITIONAL GEOLOGICAL INFO

Record geological name which indicates geological origin or soil type. Refer to Singapore Geology (BCA,2021) to record

COLOUR *BS EN ISO 14689:2018(table 1)*

Value	Light - Dark
Chroma	Reddish/ Pinkish/ Orangish/ Yellowish/ Brownish/ Greenish/ Bluish/ Greyish
Hue	Red/Pink/Orange/Yellow/Cream/Brown/ Green/Blue/White/Grey/Black

DISCONTINUITIES *BS 5930:2015+A1:2020(table 30)*

Discontinuity Type
Fault, joint, cavity, fissure, foliation, etc.

Spacing
Extremely widely-spaced (> 6 m)
Very widely-spaced (2-6 m)
Widely-spaced (0.6-2 m)
Medium-spaced (200-600 mm)
Closely-spaced (60-200 mm)
Very closely-spaced (20-60 mm)
Extremely closely-spaced (< 20 mm).

Roughness
Rough/Smooth/Striated, Stepped, Undulating, Planar

Aperture Size
Wide (0.01-0.1m),
Moderately wide (2.5-10mm)
Open (0.5-2.5 mm)
Partly open (0.25-0.5mm), Tight (0.1-0.25mm)
Very Tight (<0.1mm)

Filling (Record the width and continuity of infill)
none or void/ cavity filled deposit, etc.

Seepage
In borehole cores, measure TCR, SCR, RQD, FI

Carbonate Content *BS EN ISO 14689:2018 (section 5.5)*

Carbonate Content	Test result using 10 % hydrochloric acid
Non-calcareous	The addition of HCl produces no effervescence.
Slightly calcareous	The addition of HCl produces weak or sporadic effervescence.
Calcareous	The addition of HCl produces clear but not sustained effervescence.
Highly calcareous	The addition of HCl produces strong and sustained effervescence.

REMARK: *This field guide is intended for preliminary field logging purposes only. Field descriptions and assessments should be cross-checked with laboratory and in-situ test results.*

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