

Case 04/2026

Issue: Presumed Allowable Bearing Pressure and Bond or Friction for Foundations on Sedimentary/Meta-Sedimentary Bedrock within the Northern Metropolis

Recommendation: (1) To accept the enhanced presumed allowable vertical bearing pressure and the enhanced presumed allowable bond or friction between rock and concrete or grout for piles for foundations on Sedimentary/Meta-Sedimentary Bedrock within the Northern Metropolis (NM), which are same as those given in the GEO Technical Guidance Note No. 53 (Issue No. 2) (TGN 53) in **Appendix A**, subject to the following conditions:

(a) Enhanced Presumed Allowable Vertical Bearing Pressure for Foundations on Sedimentary/Meta-Sedimentary Bedrock

<i>Category</i>	<i>Description of sedimentary/meta-sedimentary bedrock</i>	<i>Presumed allowable bearing pressure (kPa)</i>
2(a)	Fresh to moderately decomposed, strong to moderately strong sedimentary or meta-sedimentary rocks of material weathering grade III or better, with not less than 85% of TCR of the designated grade, which has a minimum UCS of rock material not less than 25 MPa (or an equivalent point load index strength PLI_{50} not less than 1.6 MPa), with a RMR at least 40.	5 000 – 12 500 (RMR = 40-70) See Note (2).
2(b)	Moderately decomposed, moderately strong sedimentary or meta-sedimentary rock of material weathering grade III or better, and with not less than 85% of TCR of the designated grade, which has a minimum UCS of rock material not less than 20 MPa (or an equivalent point load index strength PLI_{50} not less than 1.25 MPa).	5 000
2(c)	Moderately decomposed, moderately strong to moderately weak sedimentary or meta-	3 000

	sedimentary rock of material weathering grade III or better, and with not less than 50 % of TCR of the designated grade.	
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Note:

- (1) For end-bearing foundations, TCR and/or RMR should be assessed within the load influence zone beneath the foundation base, which is twice the diameter of the foundation base, or 5 m, whichever is deeper.
 - (2) The presumed allowable bearing pressure for Category 2(a) rock should be linearly interpolated between 5 000 kPa and 12 500 kPa, corresponding to RMR values of 40 to 70.
 - (3) When assessing the RMR, rock cores should be divided into a number of segments (in consecutive sequence) such that (a) each segment is 1m in length; and (b) the average RMR of each segment satisfies the RMR corresponding to the adopted presumed bearing pressure.
 - (4) Where presumed allowable bearing pressure of more than 7 500 kPa is adopted, pile loading test should be conducted to confirm the design bearing pressure.
 - (5) Minimum socket depth along the pile perimeter is 500 mm for Categories 2(a) and 2(b); and 300 mm for Category 2(c) rocks.
 - (6) For shallow foundations, the founding level should be located at least 1.5m below the ground surface.
 - (7) Rock core specimens should be selected for UCS testing. Where length of core specimens is not sufficient for conducting UCS testing, PLSI testing may be adopted as an alternative to obtain strength index values. Specimens exhibiting prominent foliation or schistosity planes inclined at approximately 30° - 45° to the foundation loading direction should be selected, as this orientation typically corresponds to the critical minimum strength of anisotropic rocks.
 - (8) Where the assumptions for establishing the presumed allowable bearing pressures given in Sections 5.3.2 and 5.4.2 of TGN 53 are deviated, a settlement assessment of the rock mass should be conducted.
- (b) Enhanced Presumed Allowable Bond or Friction Between Rock and Concrete or Grout for Pile into Sedimentary/Meta-Sedimentary Bedrock

<i>Category</i>	<i>Presumed allowable bond or friction between rock and concrete or grout for piles (kPa)</i>	
	<i>Under Compression or Transient Tension</i>	<i>Under Permanent Tension</i>
2(a)	1 000	800
2(b)	700	560

2(c) [#]	300	150
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[#] The values for Category 2(c) are the same as those for Category 2 given in Table 2.2 of the Code of Practice for Foundations 2017 (2024 Edition) (the Code).

- (c) Other conditions listed in the Code and TGN 53 should be followed.
- (d) The presumed allowable values listed in paragraphs 1(a) and (b) should be applied to the NM only. The areas as described in Schedule 1 to the Northern Metropolis Development Bill (the Bill) are to be delineated as the area of the NM. The draft plans are attached at Annex C of the Legislative Council Brief (the Brief), which was gazetted on 3.7.2026. A copy of the Brief is attached in Appendix E. The actual coverage, area and boundary of NM should be subjected to the dedicated legislation for the Northern Metropolis.
- (e) Notwithstanding paragraph 1(d), the presumed allowable values for Category 2(b) rock listed in paragraphs 1(a) and 1(b) can be applied to areas outside the NM provided that a trial pile with proof test is conducted to verify the adopted allowable values.
- (f) The presumed allowable values listed in paragraphs 1(a) and 1(b) should not be applied to shale, mudstone, meta-mudstone, phyllite and graphite schist where these materials exist within the load influence zone beneath the foundation base (for end-bearing resistance) or within the rock socket of the pile (for bond or frictional resistance).
- (g) Settlement analysis of the foundation should be performed to take proper account of the as-constructed pile lengths/founding levels and the soil-structure interaction.
- (h) The structures supported by the foundation should be assessed to confirm that the structures can tolerate the settlements determined in paragraph 1(g).
- (i) Upon completion of the foundation works, a report containing the analyses and assessments conducted in paragraphs 1(g) and 1(h) should be submitted.
- (j) The performance of the foundations should be monitored during the construction of the superstructure works. A monitoring scheme should be submitted for agreement before the commencement of pile cap or superstructure works.

- (k) A final performance review report on the settlement behaviour of the building structure, taking account of settlement records, should be submitted for consideration and agreement prior to the application for an occupation permit.
- (l) The conditions in paragraphs 1(g) to 1(k) are not applicable to minor or temporary structures with shallow foundations on rock, such as raft and footing.
- (m) In addition to the compression proof test, if the tension capacity of a pile (based on the bond or friction between Categories 2(a), 2(b) or 2(c) rock and concrete or grout under permanent tension) exceeds 50% of the compression capacity, at least 2% of the total number of tension piles shall be selected for tension proof test. Any fraction so calculated should be construed as one additional pile for testing. The test load shall be two times the allowable tension pile capacity.
- (n) For either (i) an adopted presumed allowable bearing pressure of more than 7500 kPa for Category 2(a) rocks within the NM, or (ii) adopted presumed allowable values for Category 2(b) rocks in areas outside the NM, a proposal for a trial pile with proof test should be submitted for agreement. Consent to the commencement and carrying out of the trial pile will not be given until the trial pile proposal has been submitted and found satisfactory by the Building Authority (BA).
- (o) A performance review report of trial pile test, including the pre-drilling report, proof load test report and trial pile completion report, shall be submitted to the satisfaction of the BA upon completion of the static loading test and prior to or at the time of application for consent to the commencement of the working piles.

Decision:

Having considered the TGN 53 and noted the background information, the members had no objection to endorsing the paper subject to the following conditions:

- (a) The settlement analysis, structures assessment and final performance review report as proposed in paragraphs (1)(g), (1)(h), (1)(i), 1(j) and (1)(k) should be carried out and submitted and found satisfactory.
- (b) The tension proof test as proposed in paragraph (1)(m) should be conducted and found satisfactory.

- (c) The proposal for the trial pile test and performance review report as proposed in paragraphs (1)(n) and (1)(o) should be submitted and found satisfactory by the BA.