

WORK INSTRUCTIONS FOR ENGINEERS

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**CH-032. CHECKLIST FOR PULL OUT TEST
(SOIL NAIL)**

CHECKLIST FOR PULL OUT TEST (SOIL NAIL)

No.	CHECKLIST ITEMS	CHECKED BY G&P ENGINEER
1.0	NAIL INFORMATION	
1.1	Type of pull-out test: Preliminary (Verification test)/Working (Proof test)* * delete wherever not applicable Nail ID/Location: _____ Length: _____ m (minimum 3m of bonded length) Design Test Load: _____ kN Load Cycle: _____ cycles	☐
2.0	INFORMATION PRIOR TO TESTING AT SITE	
2.1	Is pull out test to be carried out at least 72 hours after grouting of the soil nail or achieve minimum 20N/mm ² ?	☐
2.2	At least six (6) numbers of cube samples to be prepared for the 7 days and 28 days compression test. Is the cube result (i.e 7 days) submitted to G&P for review?	☐ Yes ☐ No ☐
2.3	Is the nail installation record(s) reviewed and approved by the consultant?	Yes ☐ No ☐
2.4	Are the typical contents of the pull-out test report and loading schedule (sequence) made known to the contractor?	Yes ☐ No ☐
2.5	Calibration certificates of the following measuring devices: a) Pressure Gauge (Hydraulic Jack) - Serial No: _____ The capacity shall be at least 1.2 to 2.0 times maximum test load. b) Load Cell - Serial No: _____ c) Dial Gauges-Serial No: 1) _____ 2) _____ 3) _____ 4) _____ d) Data logger (if any) - Serial No: _____ Is the date of calibration of the above measuring devices not exceeding six (6) months ?	Yes ☐ No ☐
2.6	The description and layout/cross section of test setup shall be submitted for Engineer's approval prior to testing at site.	☐
2.7	Is the pressure gauge and load cell capable of loading up to the required test loads at site? Confirm with the contractor first before carrying out at site (sometimes it cannot due to setting-up and slope condition issue)	Yes ☐ No ☐
3.0	SLOPE CONDITION PRIOR TO TESTING	
3.1	Localised uneven slope profile shall be trimmed when necessary.	☐
3.2	To prevent excessive disturbance to the existing slope, large scale slope trimming is prohibited.	☐
3.3	If test nail is at higher ground and requiring staging, sufficient bracing and strutting shall be fixed to ensure that the staging is rigid and safe prior to pull-out testing and during monitoring works.	☐
3.4	The bearing capacity of the subsoil at the slope is adequate for pull-out test? (Check if it will subside if load increases gradually when load to the required test load).	Yes ☐ No ☐

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4.0	TESTING SETUP	
4.1	Seating base for the pull-out test is a) steel plate b) shotcrete surface c) concrete pad * * delete wherever not applicable Dimension of the seating base: L () X B () X H ()	☐
4.2	Independent Reference Beam (IRB) [distance, rigid, IRB legs shall be firmly installed, not too close to the soil nail position (minimum distance 1.0m away from the nail position and/or outside the seating base)].	☐
4.3	No compressible material between the hydraulic jack and the soil nail head.	☐
4.4	The seating preparation for the hydraulic jack (pressure gauge) shall be directly contacted on the seating base. Independently support and centre the jack over the nail bar so that the bar does not carry the weight of the testing equipment. The contact face should be even and perpendicular to the soil nail position.	☐ ☐
4.5	Visually align the dial gauges to be parallel with the axis of test nail. Sometimes, alignment load (<5% of design test load) is required to align the testing apparatus. Dial gauges should be set to 'zero' after the alignment load has been applied.	☐
4.6	Check whether the soil nail is in contact with the abovementioned seating base. (please refer to Figures below)	☐
4.7	Are the adopted pressure gauge, load cell, dial gauges, datalogger (if any) similar with the submitted calibration certificates to the consultant? Check the serial no of the measuring devices prior to start monitoring.	☐
4.8	The setting up of working pull-out test is shown in Figure below. Noticed that when carry out the pull-out test, the front portion of nail hole, which near to the cut slope face shall be empty grout to allow the nail to be pulled without obstruction.	☐
4.9	Check and record the seating of the dial gauges and the direction of the dial gauges' readings during loading and unloading. This is to confirm the reading corresponding to tensile or compression nail movement. This is important when corrections are necessary during results interpretation.	☐
5.0	DURING LOAD SEQUENCE, MONITORING AND RECORDING	
5.1	Did testing follow loading sequence and its holding period?	☐
5.2	Take and record readings before and after load increment/decrement and record all necessary info. Actual readings of load cell and pressure gauge shall be recorded, not the calculated values from the loading schedule. Refer to Soil Nail Field Record Sheet.	☐
5.3	Check the following critical movement: a) For preliminary pull-out test, 0.8 times steel characteristic strength: b) For working pull-out test, creep test (1.5 times working load): The load during the creep test shall be maintained within 2% of the intended load by use of the load cell.	☐ ☐
5.4	For creep test, is the nail movement more than 1mm within the holding periods of 1 to 10 minutes? If yes, extend to total of 60 minutes and monitor the movement and check whether more than 2mm in total.	☐

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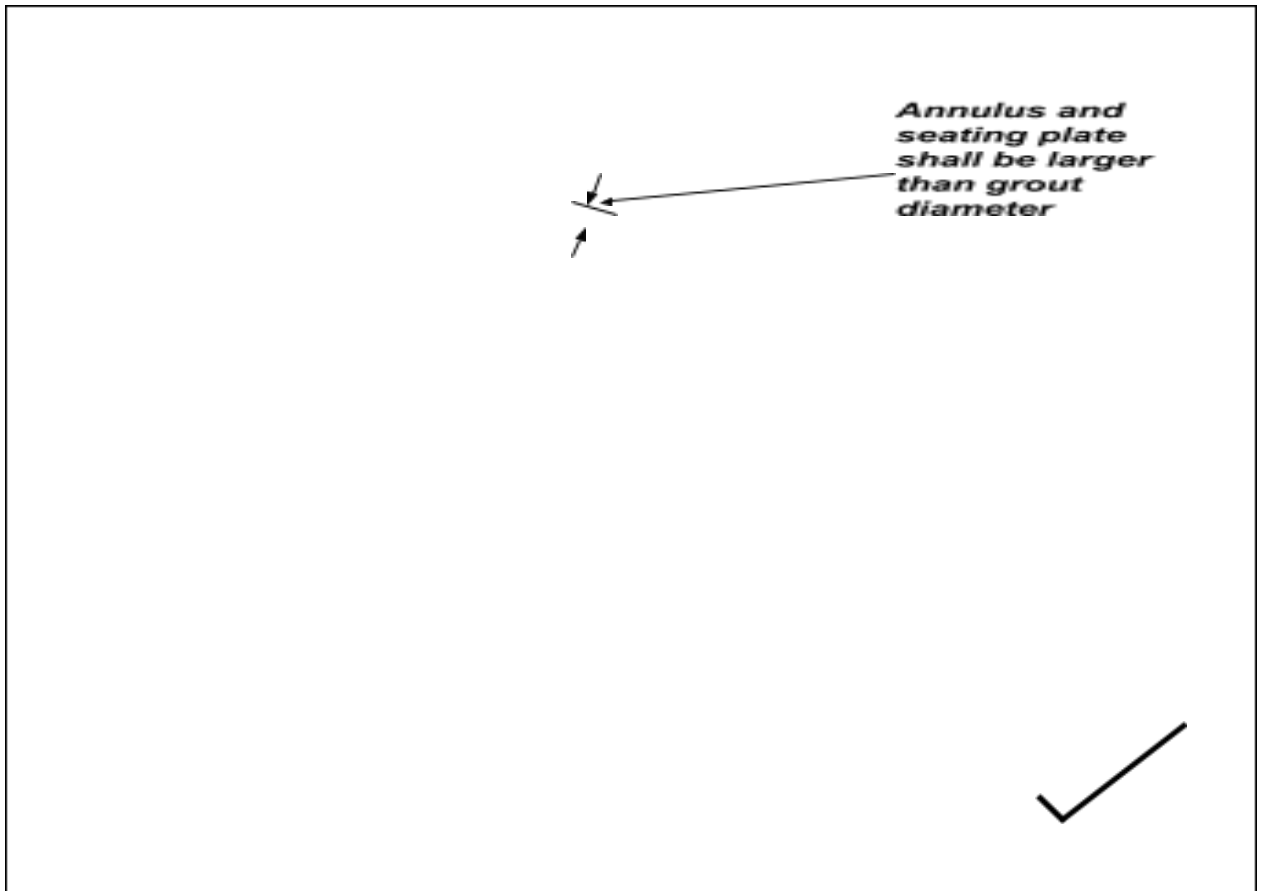
	Measure nail movement at 1,2,3,5,6,10,20,30,50 and 60 minutes during creep test.	
6.0	REPORT PREPARATION	
6.1	The following information to be included in the report submission: a) Introduction b) Methodology c) Description of Apparatus d) Test Procedure (with setting up sketch) e) Table of the Load Increment / Cycle f) Summary of Test Results g) Graphs [Applied Load (kN) vs Deflection (mm) and Applied Load (kN) vs Time (min)] h) Pull out Test Field Record Form (with verification by Site Supervising Staff) i) Detail Results of Pull Out Test j) Datalogger Output (with verification by Site Supervising Staff) k) Copies of Calibration Certificates l) Actual photos at site drawing showing the setting-up and arrangement of the apparatus/instrument adopted for the pull-out test.	
7.0	MISCELLANEOUS	
	Ensure the following are provided at site: - Stop watch and clock - Field recording form - Loading Sequence - Bubble level - Additional dial gauges - Digital camera	

PROHIBITED

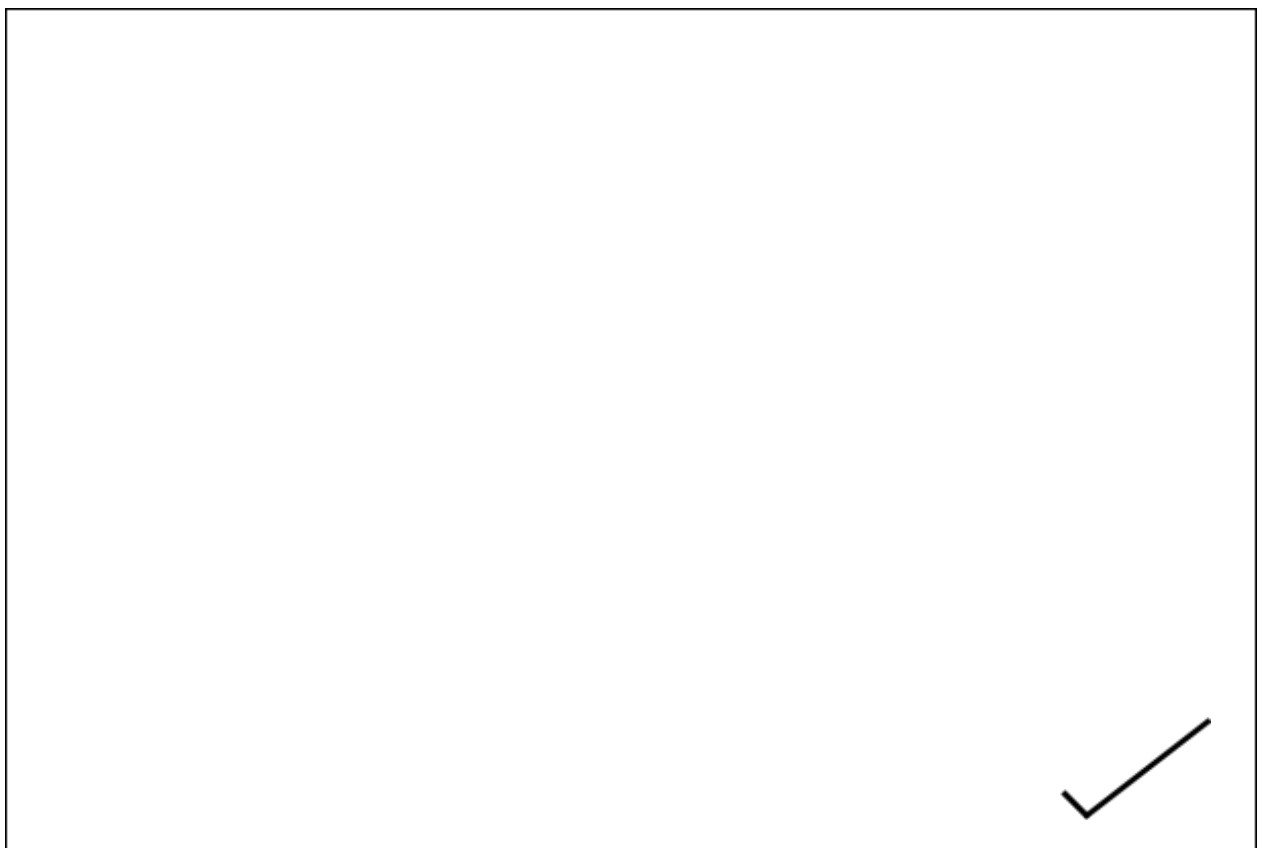


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Note: The abovementioned practice should be prohibited as it will produce false result.

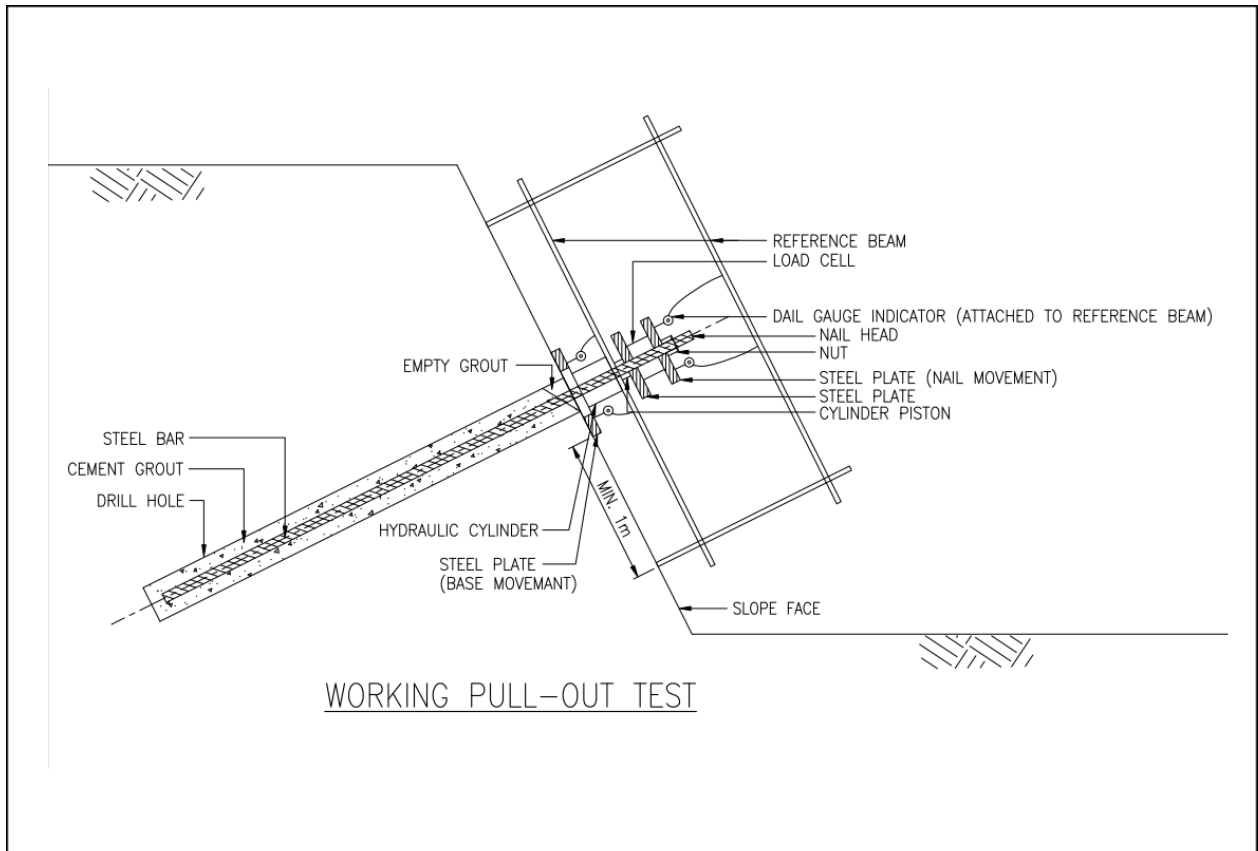


Note: **Option A** is adopted when the nail is fully grouted.



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Note: **Option B** is highly recommended.



Note: The above sketch of pull-out test is applicable for working pull-out test. For Preliminary pull-out test, the soil nail steel bar may install strain gauges along the steel bar.

CHECKLIST

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Modifications subjects of this revision concern the following pages : 3

Document consists of page : 1 to 6 (including Appendices)					No unauthorised copying is allowed.
1	7/05/2019	YHY	LPT	TYC	Item 4.8: The setting up of working pull-out test is shown in Figure below. Noticed that when carry out the pull-out test, the front portion of nail hole, which near to the cut slope face shall be empty grout to allow the nail to be pulled without obstruction.
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