

Please read these instructions carefully BEFORE you start testing!

Note: The samples shipped in 2022 are used for 2023 CCIL Aggregate Certification.

- Please report the results through the CCIL portal <https://portal.ccil.com/> using the 2023 reporting forms that will be in your lab's portal. Results are due no later than **Friday January 6, 2023**. Results reported after the deadline may potentially cause a delay in your laboratory's 2023 certification.

The intent of the proficiency testing is that a certified technician carries out the tests as part of their normal routine to gauge how the laboratory performs under typical operating conditions. You are strongly encouraged to report the results by the end of September 2022.

Note: The reports will become available after the 2023 laboratory certification application is completed and submitted through the portal. The tests on the Report will be based on the tests selected on the 2023 Application for CCIL certification, which will be available in the portal by end of July 2022.

- PLEASE DO NOT enter fictitious or 0.0 results for a test that your lab has decided not to report. If the test will not be reported, please check off "Cancel test?" or contact abriggs@ccil.com to discuss the situation. By using the "Cancel test?" option in a report you are indicating that the laboratory does not want to be certified for that test.

- All Questions regarding CCIL 2022 Aggregate submissions shall be addressed to the attention of: Anett Briggs, P.Geo.. abriggs@ccil.com

SAMPLE INFORMATION

These instructions are for 2023 CCIL Aggregate Proficiency Samples distributed and tested in 2022.

Each participant should receive the following samples:

- 1 pair (2 large bags) of coarse and fine aggregate mixture (well graded granular aggregate). These may be labelled G, A or GRA. These samples are referred to as Sample 1.22A and 2.22A.
- 1 pair (2 large bags) of coarse aggregate samples (clear stone). These may be labelled CS or ST. These Samples are referred to as Sample 1.22ST and 2.22ST.
- If you applied for soils tests (not including D698 and/or D1557), you will receive 1 pair of (2 small bags) of soil samples labelled 1.22S and 2.22S.

Note: Soil samples were not provided if ASTM D698, or D698 and D1557, are the only soils tests on your lab's 2022 certification. Proctor tests are performed on the fine portion of aggregate samples 3.22A and 4.22A as instructed below.

- If you requested participation in LS-609, Petrographic Analysis of Coarse Aggregate, you will receive separate instructions for these test. Additional samples must be requested for each additional PN Analyst.

Contact the CCIL certification office gkermath@ccil.com or Anett Briggs, P.Geo. abriggs@ccil.com if additional PN samples are required.

- If you requested participation in Accelerated Detection of Potentially Deleterious Alkali-Silica Reactive Aggregate by Expansion of Mortar Bars CSA A23.2-25A (MTO LS-620), you will receive separate instructions for this test.

Summary of tests to be performed on each material:

Test	1.22A, 2.22A	1,22ST, 2.22ST	1.22S, 2.22S
Preparation of Sample, ASTM C702	X		
Sieve Analysis, ASTM C136	X		
Percent Fractured Particles, ASTM D5821	X		
Magnesium Sulphate Soundness (coarse aggregate), ASTM C88	X		
Relative Density and Absorption (Fine Aggregate), ASTM C128	X		
Micro-Deval Abrasion Loss (Fine Aggregate), ASTM D7428	X		
Compaction Characteristics of Soil, Standard Effort, ASTM D698	X		
Uncompacted Void Content of Fine Aggregates, ASTM C1252	X		
Sand Equivalent of Fine Aggregate, ASTM D2419	X		
Wash Pass 75 µm, ASTM C117		X	
Relative Density and Absorption (Coarse Aggregate), ASTM C127		X	
Coarse aggregate gradation for calculating weighted average results (not on report form)		X	
Percent Flat & Elongated Particles, ASTM D4791		X	
Los Angeles Abrasion, ASTM C131		X	
Micro-Deval Abrasion (Coarse Aggregate), ASTM D6928		X	
Freezing and Thawing of Coarse Aggregate, CSA A23.2-24A		X	
Particle Size Analysis of Soils, AASHTO T88			X
Liquid Limit, Plastic Limit and Plasticity Index of Soils, ASTM D4318			X
Specific Gravity of Soils, ASTM D854			X

INSTRUCTIONS

- Each test method must be carried out in pairs by the same certified technician. For example, the Technician who performs the sieve analysis on Sample 1.22A must also perform the sieve analysis on Sample 2.22A. The same Technician need not perform every test method. For example, Technician 'A' may perform the Micro-Deval Abrasion (MDA) tests and Technician 'B' may perform the Flat and Elongated tests, as long as the same Technician performs the particular test on both samples.

- Carry out the non-destructive tests first. Material used for the non-destructive tests may be recombined to form samples to prepare for the remaining tests, as indicated below.

NOTE: To maintain certification, you are required to submit results on all Type C tests and those Type D tests for which you are certified.

Each lab is advised to perform the tests in such an order to ensure sufficient material.

TESTS TO BE PERFORMED ON SAMPLES 1.22A AND 2.22A (WELL GRADED AGGREGATE):

1. **PREPARATION OF SAMPLE, ASTM C702:** Dry all aggregate (not soil) samples to a constant mass in an oven at $110 \pm 5^\circ\text{C}$.
2. **SIEVE ANALYSIS, ASTM C136:** Test the entire sample of each 1.22A and 2.22A to determine the coarse aggregate gradation. Both samples shall be tested using the same nest of coarse sieves including sizes 19.0, 16.0, 12.5, 9.5, and 4.75 mm. Report the percent passing to 0.01%.

Label the material passing the 4.75 mm sieve **3.22A and 4.22A**, respectively and keep separate for fine aggregate testing below. Record the total mass of the passing 4.75 mm prior to splitting, to be able to calculate the percent passing based on the original sample.

Reduce the mass of the fine portion of samples 1.22A and 2.22A (labelled 3.22A and 4.22A) by splitting the material passing the 4.75 mm sieve from the above sieve to a minimum 300 g sample as detailed in ASTM C136 Clause 7.3. Wash the split test portion over a 0.075 mm sieve in accordance with ASTM C117 and dry prior to sieving. Use the same fine aggregate nest of sieves for both samples including sieve sizes 2.36, 1.18, 0.600, 0.300, 0.150, and 0.075 mm.

Compute the fine aggregate cumulative percent passing for each sample based on the total mass sieved (coarse and fine combined) as detailed in ASTM C136 Clause 8.5.1. Include the washed material in your fine split sample total. Report the cumulative percent passing for each sieve to the nearest 0.01%.

3. **PERCENT FRACTURED PARTICLES, ASTM D5821:** For both Type C and Type D Fractured Particles tests, use the entire coarse aggregate material of samples 1.22A and 2.22A that is coarser than 4.75 mm. Perform the test on all the material retained on the 4.75 mm sieve of the samples 1.22A and 2.22A, respectively, according to the test method. Determine the percentage of fractured particles with at least one fractured face by mass. Report the percentage of material to the nearest 0.1%. This material may be recombined to form samples for other tests.
4. **MAGNESIUM SULPHATE SOUNDNESS (COARSE AGGREGATE), ASTM C88:** Prepare test specimens from the samples 1.22A and 2.22A on the following three fractions:
Passing (P) 19.0/Retained (R) 12.5 mm, P 12.5 / R 9.5 mm and P 9.5 / R 4.75mm with masses listed in ASTM C88 Clause 7.3. The test is to be run using magnesium sulphate and five cycles. Record the initial and final masses to 0.1 g and calculate sample loss to the nearest 0.1% for each size fraction tested,

based on the total mass of that size fraction. Compute the weighted average for each of the samples 1.22A and 2.22A based on the coarse gradation (percent retained) in Step 2, after adjusting the percentages so the coarse portion accounts for 100%. Report a weighted sample loss to the nearest 0.1%. An example of calculating weighted averages is provided following the testing instructions. **Do not re-use this material.**

FINE AGGREGATE TESTS TO BE PERFORMED ON SAMPLES 3.22A AND 4.22A:

5. **RELATIVE DENSITY AND ABSORPTION (FINE AGGREGATE), ASTM C128:** Use the fine material 3.22A and 4.22A to prepare the test specimens according to ASTM C128 and remove the material finer than 0.075 mm in accordance with ASTM C117 as discussed in ASTM C128 Appendix X1. Saturate the test specimens from each sample by immersion in water for 24 ± 4 hours. Report the Fine Aggregate Oven Dry Relative Density, BRD Fa (OD), to the nearest 0.001. Calculate the Absorption ABS Fa and report the results to the nearest 0.01%.
6. **MICRO-DEVAL ABRASION LOSS (FINE AGGREGATE), ASTM D7428:** Prepare test specimens from samples 3.22A and 4.22A according to ASTM D7428 Clause 8.2. Run a control sample at the same time. If you do not have a supply of the control aggregate on hand, contact the MTO Soils and Aggregates Section at (416) 235 3698 or soils-aggregates@ontario.ca . Report the test Sample Loss to the nearest 0.1%. Report your control aggregate loss and known limits to the nearest 0.1% in the comments. **Do not re-use this material.**
5. **COMPACTION CHARACTERISTICS OF SOIL, STANDARD EFFORT METHOD ASTM D698:** Carry out this test on a minimum of 6 kg of samples 3.22A and 4.22A, respectively. This is the material passing the 4.75 mm sieve. Follow ASTM D698 Method A to perform the test for compaction. **DO NOT CORRECT** the results to compensate for oversized particles. ASTM D698 does not allow re-use of compacted material, however, for CCIL proficiency testing purposes **ONLY**, you may re-use the material within this test and add water for each succeeding trial. No standing time is required. Should you observe excessive water run-off from the mould during compaction and/or aggregate break-down during the trials, please note it in the comments section on the reporting form. Report the wet and dry maximum densities in Mg/m^3 (i.e. 2.345, **not** 2345 kg/m^3) to the nearest 0.001 and optimum moisture content to the nearest 0.1% on the 2023 Soil reporting form in your portal. (Note: $\text{Mg/m}^3 = \text{g/cm}^3$). **Do not re-use this material for other tests.**
6. **UNCOMPACTED VOID CONTENT OF FINE AGGREGATE, ASTM C1252:** Prepare the individual test specimens from 3.22A and 4.22A. Perform the uncompact void content test in accordance with ASTM C1252 Test Method A. Compute the uncompact void contents using the bulk dry specific gravity values of Samples 3.22A and 4.22A determined according to ASTM C128. Report the uncompact voids to the nearest 0.1%. Indicate the bulk dry specific gravity values used to the nearest 0.001 in the comments of the report on the portal.

7. SAND EQUIVALENT VALUE OF FINE AGGREGATE, ASTM D 2419: Obtain at least 1500 g from each fine aggregate sample 3.22A and 4.22A. Prepare the test specimens in accordance with Procedure A or B. Report the average sand equivalent value to the nearest 0.1%. Include whether you used Procedure A or B in the comments of the report in the portal.

TESTS TO BE PERFORMED ON SAMPLES 1.22ST AND 2.22ST (CLEAR STONE):

8. WASH PASS 75 μm , ASTM C117: Use Sample 1.22 ST and 2.22 ST for this test. Obtain an appropriate quantity of material for test method ASTM C117. Split the sample in accordance with ASTM C702 as required by the test method. Wash the entire split test portion. Report the Percent Loss to 0.01%.
9. RELATIVE DENSITY AND ABSORPTION (COARSE AGGREGATE), ASTM C127: Prepare the samples for this test from the samples 1.22ST and 2.22ST. Report the Coarse Aggregate Oven Dry Relative Density, BRD Ca (OD), to the nearest 0.001. Report the Coarse Aggregate Absorption ABS Ca to the nearest 0.01%.
10. Perform a coarse aggregate gradation on the samples 1.22ST and 2.22ST in order to calculate the weighted average for the percent Flat and Elongated as per ASTM D4791 and Freezing and Thawing, CSA A23.2-24A, if performing. An example the calculation of weighted averages is provided following the testing instructions for your reference. Separate the respective material into required sieve sizes for the subsequent tests to be performed on 1.22ST and 2.22ST.
11. PERCENT FLAT AND ELONGATED PARTICLES, ASTM D4791: For both Type C and Type D Flat and Elongated tests, use the materials retained on the 4.75 mm sieve of samples 1.22ST and 2.22ST. Perform the test in accordance with Method B of ASTM D4791 Clause 8.4 on approximately 100 particles of each of the following three fractions: Passing(P) 19.0/Retained(R) 12.5 mm, P 12.5/R 9.5 mm, and P 9.5/R 4.75 mm. Perform the test using 5:1 ratio. For purposes of ASTM D4791 Clauses 8.4.2, 9.1, and 10.1.4.2, the calculations shall be "by mass". Compute the weighted average based on the gradation (percent retained) of samples 1.22 ST and 2.22ST, respectively, adjusting the percentages so the coarse portion used is 100%. Report the weighted average to the nearest 0.1%. This material may be recombined to form the sample for other tests.
12. LOS ANGELES ABRASION, ASTM C131: Prepare the test specimens from the samples 1.22ST and 2.22ST. Carry out the test as outlined in the ASTM C131 Table 1 Grading B. Report the Loss to the nearest 0.1%. **Do not re-use this material.**
13. MICRO-DEVAL ABRASION (COARSE AGGREGATE), ASTM D6928: Prepare the test specimens from the samples 1.22ST and 2.22ST, according to ASTM D6928 Clause 8.2. Run a control sample at the same time. If you do not have a supply of the control aggregate on hand, contact the MTO Soils and Aggregates Section at (416) 235 3698 or soils-aggregates@ontario.ca . Record the Test Sample

Loss to the nearest 0.1%. Report your known limits of the control sample tested and loss to the nearest 0.1% in the comments of the portal report. **Do not re-use this material.**

14. **FREEZING AND THAWING OF COARSE AGGREGATE, CSA A23.2-24A:** Prepare the test fractions from samples 1.22ST and 2.22ST as follows: Passing (P) 19.0 / Retained (R) 12.5 mm = 1250 g, P 12.5 / R 9.5 mm = 1000 g, P 9.5 / R 4.75 mm = 500 g. Do NOT determine the freeze-thaw value for 26.5 mm to 19.0 mm fraction. Assign the same freeze-thaw value of the next smaller fraction, i.e., 19.0 – 12.5 mm, for the 26.5 mm to 19.0 mm fraction. All 4 fractions shall be used to compute the weighted average. Determine the freeze-thaw values for each fraction tested and calculate the weighted average based on the gradation (percent retained) of samples 1.22 ST and 2.22 ST, adjusting the percentages so the coarse portion used is 100%. Run a control sample at the same time using the gradation in Table 1 of CSA A23.2-24A. If you do not have a supply of the control aggregate on hand, contact the MTO Soils and Aggregates Section at (416) 235 3698 or soils-aggregates@ontario.ca . Report the weighted average freeze-thaw loss to the nearest 0.1%. Indicate the following in the comments section of the portal report (1) the known limits and (2) loss to the nearest 0.1% of the control sample tested, and (3) the sieve results (percent passing) from Step 10 above for the 26.5, 19.0, 16.0, 12.5, 9.5, 4.75 mm sieves. **Do not re-use this material.**

SOIL PROFICIENCY SAMPLES

If you applied for soils tests other than D698 or D1557, you have received 1 pair (2 small bags) of soil samples labelled 1.22S and 2.22S.

Note: Soil samples were not provided if ASTM D698, or D698 and D1557, are the only soils tests on your lab's 2022 certification. Proctor tests are performed on the aggregate sample 1.22A and 2.22A as instructed above.

15. **PARTICLE SIZE ANALYSIS OF SOILS, AASHTO T88:** Prepare individual test specimens from samples 1.22S and 2.22S. Use a freshly prepared dispersing agent with distilled water and 40 grams of sodium hexametaphosphate per litre of solution and ensure the pH value of the solution is adjusted to 8 or 9. The soil samples supplied should be dispersed in the stirring apparatus for 10 minutes. Compute the specific gravity correction factor α and constant K assuming a value of 2.745 for the specific gravity of soil particles (DO NOT use the values determined by your lab). Upon completion of the test, compute Constant K, Coefficient of Viscosity η , and Particle Diameter D to four significant digits (i.e., 0.0001), and record the results in the comment of the portal report. Report the Percent passing the 2.0 mm, 425 μ m, 75 μ m, 20 μ m, 5 μ m and 2 μ m sieves to the nearest 0.1 percent.
16. **LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS, ASTM D4318:** Determine the Liquid Limit, Plastic Limit and Plasticity Index of soil samples 1.22S and 2.22S according to ASTM D4318. Prepare the test specimens as outlined in ASTM D4318 Clause 11.2 – Dry Preparation and determine the Liquid Limit according to the procedure described in ASTM D4318 Clause 12.0, Method A – Multi-point Liquid Limit. Determine the Plastic Limit using a minimum of two trials and

report the mean value. Report the Liquid Limit, Plastic Limit and Plasticity Index to the nearest one decimal, i.e., 0.1 percent.

17. **SPECIFIC GRAVITY OF SOILS, ASTM D854:** Determine the specific gravity of soil samples 1.22S and 2.22S according to ASTM D854. Carry out the test according to the procedures outlined in ASTM D854 Clause 9.3 –Method B - Procedures for Oven Dried Specimen. Perform the test on a minimum of three specimens and report the Mean Specific Gravity of the soil to the nearest three decimal places (0.001). The calculated test results from three specimens (range) should be within 0.020 of each other. If the range exceeds 0.020, the test must be repeated.

TESTS TO BE PERFORMED ON SEPARATE SAMPLES FOR INDIVIDUAL TESTS:

18. **PETROGRAPHIC ANALYSIS OF COARSE AGGREGATE, METHOD LS-609, PART A:** If you have selected this test, instructions for this test method will be provided separately.
19. **ACCELERATED DETECTION OF POTENTIALLY DELETERIOUS ALKALI-SILICA REACTIVE AGGREGATE BY EXPANSION OF MORTAR BARS, CSA A23.2-25A (MTO LS-620):** If you have selected this test, instructions for this test method will be provided separately.

Example for calculating Weighted Average

Material Size Fraction (mm)	Original sieved individual percent retained	Original Sieved % retained of tested portions	Adjusted percent for Weighted average	Test result per size fraction	Weighted average
>19.0	2%		Not tested		
19.0 to 12.5	12%	12	$12/60=20$	55	$20*55/100=11$
12.5 to 9.5	18%	18	$18/60=30$	70	$30*70/100=21$
9.5 to 4.75	30%	30	$30/60=50$	42	$50*42/100=21$
<4.75 (pan)	38%		Not tested		
Total	100	60	100		$(11+21+21)=53$

Reported result **53%**

Note that, as instructed in point 14 above, for freeze-thaw CSA A23.2-24A, the 26.5 to 19.0 mm size fraction is to be included in the calculation with an assumed test result based on the result for the next smaller size fraction.