

CCIL Aggregate and Soil Proficiency Sample Program  
Ontario and Québec

## 2021 ONTARIO AND QUÉBEC MINI-CORRELATIONS

### AGGREGATES and SOILS INCLUDING SUPERPAVE AGGREGATES

Please read the following Mini-Correlation instructions carefully BEFORE you start testing!

- Testing of mini correlation samples shall be according to the below instructions.
- Submission of results by **March 31<sup>st</sup> 2021** in the mini correlation report(s) provided in the labs portal. <https://portal.ccil.com/> After signing into the portal, all mini-correlation reporting forms appropriate to your lab certification will be accessible under the tab for **Reporting Forms**. You will be able to enter your test results into the forms and submit to CCIL through the portal.
- Please record the mini-correlation sample identification information found on the sample labels in the “Comments” section of the reporting forms and send any photos of unclear labels to [ewordenkwok@ccil.com](mailto:ewordenkwok@ccil.com)

### SAMPLES FOR MINI-CORRELATION TESTING

- Samples for the mini-correlation were shipped to the laboratory March 12<sup>th</sup> due to delays. The Due date has been extended to March 31<sup>st</sup>.
- The mini-correlation samples are pre-prepared to meet the requirements of the appropriate test method and are to be tested as received unless instructed otherwise.
- Generally, only one sample will be shipped for each test requiring a mini-correlation. Tests for a mini-correlation are not generally carried out in pairs.

### ONTARIO AND QUÉBEC MINI-CORRELATION INSTRUCTIONS – AGGREGATES

#### LS-600: Sample Preparation

Dry all mini-correlation aggregate samples to a constant mass at  $110 \pm 5^\circ\text{C}$ .

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#### LS-602/C136: SIEVE ANALYSIS OF AGGREGATES,

If the problem with your original test results was with the fine aggregate sieves only, your lab will receive a mini-correlation sample of fine aggregate only. Otherwise, your lab will receive a combined coarse aggregate and fine aggregate sample.

#### Combined

If you receive a **combined coarse and fine aggregate sample**, test the entire mini-correlation sample as specified in LS-602 to determine the aggregate gradation. Report the percent passing on each sieve listed in the portal report ( 19, 16, 13.2, 9.5, 4.75, 2.36, 1.18, 0.6, 0.3, 0.15 and 0.075 mm ). All sieves are to be reported to 1 decimal ( 0.1% ), except the 4.75 mm and 0.075 mm sieves are to be reported to two decimal places ( 0.01% ).

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Fine Only

If you receive **only fine aggregate** for the mini-correlation sample, test the entire mini-correlation sample as specified in LS-602 on the 2.36, 1.18, 0.6, 0.3, 0.15 and 0.075 mm sieves. However, when reporting the % passing, use the value from the following table to reduce the % passing on each sieve by the factor provided. All sieves are to be reported to 1 decimal ( 0.1% ), except the 0.075 mm sieve is to be reported to two decimal places ( 0.01% ).

Mini sample year on label	Factor for original % passing the 4.75mm sieve
2019	0.3786
2020	0.531
2021	0.3801

Example: Using 2017 value above

Sieve (mm)	Fine Aggregate % Passing of sample	Multiplication factor (%Passing 4.75mm)	Value to be reported in the portal report (% Passing of original)
2.36	77.7	0.4908	38.1
1.18	58.2	0.4908	28.6

**LS-601 / C117: Wash Passing 0.075 mm sieve.**

Test the entire mini correlation sample as specified in Guideline A of LS-601. Report the Percent Loss to one decimal (0.01%).

**LS-607: PERCENT CRUSHED PARTICLES IN PROCESSED COARSE AGGREGATE OR**

**ASTM D5821: PERCENTAGE OF FRACTURED PARTICLES IN COARSE AGGREGATE**

The mini-correlation sample is comprised of a single test sample with all the of size fractions combined. Separate the sample into size fractions according to the table below. Do NOT determine the crushed particles/ fractured particles of 26.5 mm to 19.0 mm fraction. Assign the same percent crushed value from the 19.0 mm – 13.2 mm fraction, to the 26.5 mm to 19.0 mm fraction.

Passing sieve	Retained Sieve	Minimum Mass, g
19	13.2	1250
13.2	9.5	500
9.5	6.7	200
6.7	4.75	75

Determine the percentage of material with at least one fractured face to the nearest 0.1%

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All 5 fractions shall be used to compute the weighted average according to the following gradation.

Sieve	Percent passing for total sample (coarse and fine) by Year on Mini Sample label			
	2018	2019	2020	2021
26.5	100	100	100	100
19.0	95.4	97.7	97.9	97.9
13.2	59.3	72.7	48.7	48.7
9.5	28.8	47.7	14.7	14.7
6.7	10.8	25.8	3.3	3.3
4.75	2.6	13.7	0.8	0.8

Report the weighted average to the nearest 0.1%.

**LS-608 OR ASTM D4791: PERCENT FLAT AND ELONGATED PARTICLES**

The mini-correlation sample is comprised of a single test sample each, representing all of the size fractions combined. Do not separate into sized fractions. Test the portion of the sample retained on the 4.75mm sieve only. Test as a single fraction and report a Percent Flat and Elongated particles on that basis.

For Type C LS-608 use a 4:1 ratio, For Type D Superpave Properties ASTM D4791 use a 5:1 ratio.

Report the overall weighed average the result to the nearest 0.1%.

**LS-621: AMOUNT OF ASPHALT COATED PARTICLES IN COARSE AGGREGATE**

Test the entire mini correlation sample. Carry out the test as outlined in LS-621 and report the Percentage of Asphalt Coated Particles to the nearest 0.1%

**LS-603/C131&C535: LOS ANGELES ABRASION**

Carry out the test as outlined in the test procedure using Gradation B as given in Table 2. Report the Loss to the nearest 0.1%.

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**LS-604/C127: RELATIVE DENSITY AND ABSORPTION (COARSE AGGREGATE)**

Carry out the test as outlined in the test procedure. The mini-correlation sample size allows for duplicate testing. Report the Average Relative Density (OD) to three decimal places ( 0.001 ). Calculate and report the Average Percent Absorption and report to 2 decimal places ( 0.01% ).

**LS-606/C88: MAGNESIUM SULPHATE SOUNDNESS (COARSE AGGREGATE)**

Carry out the test as outlined in the test procedure, using the masses from the table below.  
Run five cycles on the below three fractions:

Fraction	Mass, g
19.0 mm - 13.2 mm	1500
13.2 mm - 9.5 mm	500
9.5 mm - 4.75mm	300

Compute the percentage loss of each of the three fractions tested. Report a weighted sample loss calculated using the following gradation based on the mini samples label.

Sieve	Percent passing for total sample (coarse and fine) by Year on Mini Sample label				
	2017	2018	2019	2020	2021
26.5	100	100	100	100	100
19.0	82.8	95.4	97.7	97.9	97.9
13.2	43.4	59.3	72.7	48.7	48.7
9.5	22.7	28.8	47.7	14.7	14.7
6.7	8.9	10.8	25.8	3.3	3.3
4.75	4.25	2.6	13.7	0.8	0.8

Report the weighted sample loss to the nearest 0.1%.

**LS-618/D6928: MICRO-DEVAL ABRASION (COARSE AGGREGATE)**

Carry out the test as outlined in the test procedure. Prepare three fractions with the below mass for each fraction.

- 19.0 mm to 16.0 mm - 375 g
- 16.0 mm to 13.2 mm - 375 g
- 13.2 mm to 9.5 mm - 750 g

Recombine and test the 1500g sample in accordance with the test method. Report the mini-correlation test sample loss to the nearest 0.1%.

Run a control sample at the same time. Report your control sample tested (Drain Brothers or MTO RM CA2), and Loss to the nearest 0.1% in the comments section of the portal report.

**LS-614: FREEZING AND THAWING OF COARSE AGGREGATE**

Carry out the test as outlined in the test procedure. Prepare the test samples from the materials passing 19.0 mm and retained on 4.75 mm sieves according to section 5 of the LS-614 test method. Do NOT determine the freeze-thaw value for 26.5 mm to 19.0 mm fraction. Assign the same freeze-thaw value from 19.0 - 13.2 mm, to the 26.5 mm to 19.0 mm fraction. All 4 fractions shall be used to compute the weighted average.

Passing sieve	Retained Sieve	Minimum Mass, g
26.5	19	NA
19	13.2	1250
13.2	9.5	1000
9.5	4.75	500

Compute the percent loss of each fraction and calculate the weighted average using the below gradation and the guidelines in Section 8 of MTO LS-614.

Sieve	Percent passing for total sample (coarse and fine) by Year on Mini Sample label				
	2017	2018	2019	2020	2021
26.5	100	100	100	100	100
19.0	92.5	98.2	91.2	90.7	98.2
13.2	75.9	71.9	68.4	64.4	71.9
9.5	64.4	59.7	52.6	52.7	59.7
4.75	49.1	42.6	38	38.2	42.6

Report the weighted percentage of freeze-thaw loss to the nearest 0.1%.

Run a control sample at the same time. Report your lab control sample tested (Drain Brothers or MTO RM CA2), and Loss to the nearest 0.1%.

**LS-605/C128 RELATIVE DENSITY AND ABSORPTION OF FINE AGGREGATE,**

Carry out the test as outlined in the test procedure. The mini-correlation sample size allows for duplicate testing. Saturate the test specimens from both samples by immersion in water for  $24 \pm 4$  hours. Report the Average Relative Density (OD) to three decimal places ( 0.001 ). Calculate and report the Average Percent Absorption and report to 2 decimal places ( 0.01% ).

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**LS-619/D7428 MICRO-DEVAL ABRASION LOSS OF FINE AGGREGATE,**

Prepare 500 g test specimens from the mini-correlation samples according to the test method and the table below.

Passing	Retained	Mass g
4.75	2.36	50
2.36	1.18	125
1.18	0.600	125
0.600	0.300	100
0.300	0.150	75
0.150	0.075	25

Report the mini-correlation sample loss to the nearest 0.1%.

Run a control sample at the same time. Report your laboratory control sample tested (Sutherland sand or James Dick) and Loss to the nearest 0.1%.

**LS-629/C1252 (Formerly T304) UNCOMPACTED VOID CONTENT OF FINE AGGREGATE,**

DO NOT use the specific gravity values determined by your lab. Use the following values based on the year of the mini-correlation sample received.

2017	2018	2019	2020	2021
2.692	2.631	2.696	2.680	2.687

Report the uncompact voids to the nearest 0.1%.

**D2419 / T176: SAND EQUIVALENT VALUE OF FINE AGGREGATE**

Prepare the test specimens in accordance with ASTM D2419 Procedure A or B. Report the average sand equivalent value to the nearest 0.1%, and in the comments specify whether you used Procedure A or B.

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**LS-702 / T88 (formerly D422): PARTICLE SIZE ANALYSIS OF SOILS**

Prepare the test specimens in accordance with LS-702. Use a freshly prepared dispersing agent with distilled water using 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  $\alpha$  and constant K using the value in the table below for the specific gravity of soil particles (DO NOT use the values determined by your lab).

2018	2019	2020	2021
2.775	2.770	2.750	2.775

Report the percent passing the 2.0 mm, 425 $\mu$ m, 75 $\mu$ m, 20 $\mu$ m, 5 $\mu$ m and 2 $\mu$ m sieves to one decimal ( 0.1 % ).

**LS-703/ LS-704 / D4318: Liquid Limit, Plastic Limit and Plasticity Index of Soils**

Determine the Liquid Limit, Plastic Limit and Plasticity Index of mini-correlation soil sample provided according to ASTM D 4318. Prepare the test specimens as outlined in Section 10.2 – Dry Preparation, and determine the Liquid Limit according to the procedure described in Section 11.0, 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.

**LS-705 / D854: Specific Gravity of Soils**

Prepare

Determine the specific gravity of the mini-correlation soil sample provided according to MTO LS-705. Carry out the test according to the procedures outlined in Section 8.1 – Procedures for Oven Dried Specimen.

Perform the test on minimum of three specimens. The test results from three specimens (range) should be within 0.02 of each other. If the range exceeds 0.02, the test must be repeated. Report the Mean Specific Gravity of the soil to three decimal places (0.001).

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**LS-706 /D698: MOISTURE-DENSITY RELATIONSHIP**

Follow LS-706 (ASTM D698 Method C) to perform the test on only the materials passing 19.0 mm sieve for compaction. Use the following parameters to compute correction for oversize particles:

- \* Bulk specific gravity of the oversize fraction = 2.620
- \* Water content of the oversize fraction = 0.90%

Calculate corrected optimum moisture content according to equation (4) of ASTM D 4718.

Calculate corrected maximum dry density using the following equation:

$$C_{p_d} = (100 \rho_F G_M) / (\rho_F P_C + G_M P_F)$$

where:

$C_{p_d}$  = corrected dry density of the total material (combined finer and oversize fractions),

$G_M$  = bulk specific gravity,

$\rho_F$  = dry density of the finer fraction,

$P_C$  = Percent of oversize coarse fraction by weight, and

$P_F$  = Percent of oversize finer fraction by weight,

Example Calculation:

Given  $G_M = 2.62$ ,  $\rho_F = 2.250$ ,  $P_C = 12.2\%$ ,  $P_F = 87.8\%$

$$C_{p_d} = (100 \times 2.250 \times 2.62) / (2.250 \times 12.2 + 2.65 \times 87.8) = 2.289$$

Report the maximum wet density (MWD) in t/m<sup>3</sup>, corrected maximum dry density (MDD) in t/m<sup>3</sup>, and corrected optimum moisture content (OMC) in percentage. (Note: t/m<sup>3</sup> = g/cm<sup>3</sup> eg 2.222).

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