

SECTION 834 QMP - Aggregate

834.1 Sampling and Testing

Aggregate sampling techniques and minimum sample sizes must be in accordance with the appropriate sample method. Use of larger samples should be considered by the QC staff to increase the probability of obtaining a representative sample. When split samples are required, the field sample size shown in [CMM 850](#) needs to be doubled.

834.1.1 Sampling During Production or Before Placement

For contract-required production or before-placement sampling, the contractor can obtain samples from the finished product conveyor belt or stockpile. Obtaining samples from the belt discharge is acceptable if the full production stream can be obtained with sufficient rapidity and safety.

Production samples are taken during aggregate crushing and stockpile operations and can only be conducted or witnessed by HTCP certified QC personal. Individual QMP provisions may allow for optional production testing as an alternative to in-place, stockpile or loadout samples before the beginning of a project. If production test results are submitted, documentation of random sampling must be provided.

Stockpile samples are taken after the contract is awarded, before placement and test results can be used for multiple projects within the QMP provision's specified timeframe. After aggregate placement begins, no additional stockpile samples are required for that project. Taking additional stockpile tests may be advisable depending on project circumstances. If a project is suspended and the aggregate source continues to be used on other non WisDOT projects or new material is added to the stockpile, taking a stockpile sample is advisable before resuming placement. If a project is suspended for over six months, taking an additional stockpile sample is advisable before resuming placement. Multiple stockpile tests for the same project and source are not required.

All sampling of aggregate used for acceptance testing must be random. If, for any reason, a random location will not be reached, a new random location within the partial lot may be required. Refer to [standard spec 700](#) for partial lot sampling requirements. To prevent missing any quality control tests, the engineer should establish clear instructions for quality control sampling of partial lots as early as possible in the project; ideally at the preconstruction meeting. Instructions should be agreed upon by the engineer and contractor before any partial subplot sampling occurs.

834.1.2 Sampling During Placement

Revise guidance for engineer to consider directing or conducting additional placement tests.

Sampling must take place after blading and shaping but before beginning compaction. The intent is to obtain samples as near to the final placement location of the material as possible so as to truly represent the aggregate placed. Sampling from roadbed windrows should only be used when the subgrade is granular, and it would not be possible to differentiate the change in material between the crushed aggregate base course and the granular subgrade.

The engineer should consider directing or conducting an additional placement test for the following scenarios:

- Material is added to an existing stockpile.
- A depleted stockpile is replaced.
- Material is suspected to be nonconforming.

The quantity of materials for roadbed field sampling should be doubled since samples are needed for both quality control and department testing according to special provision requirements of the contract.

834.1.3 Sieve Analysis

Sieve analysis testing must follow procedure outlined in [WTM T11](#) and [WTM T27](#). The sample weights derived from this procedure are minimums. As has been pointed out for field sample sizes, using larger samples should be given careful consideration by the QC staff to increase the probability of obtaining a representative sample.

Test data and calculation results should be recorded on a copy of [DT1348](#), Sieve Analysis for Mixture of Fine and Coarse Aggregates. For consistency throughout the testing operations, it is preferred the test mass be made in units of grams. Figure 834-1 is an example of a completed test data sheet for a typical sample of aggregate base course material.

FIGURE 834-1 Example Sieve Analysis for Mixture of Fine and Coarse Aggregates, DT1348

SIEVE ANALYSIS FOR MIXTURE OF FINE AND COARSE AGGREGATES DT1348 2/2006 Project Information										Wisconsin Department of Transportation			
Project 1001-01-00							Contract		County Rock				
Deposit Identification							Contractor and/or Producer Brewers Stone		Sample No. 10T				
<input checked="" type="checkbox"/> Crushed Stone <input type="checkbox"/> Crushed Gravel <input type="checkbox"/> Blend			<input checked="" type="checkbox"/> Base Course <input type="checkbox"/> Other		<input type="checkbox"/> 3/4 inch <input checked="" type="checkbox"/> 1 - 1/4 inches <input type="checkbox"/> 3 inches <input type="checkbox"/> Open Graded <input type="checkbox"/> Other			Sampled at 120 + 00, Top, 9' RT		Date 5/28/09			
Materials Accepted at							Time 3:20 pm						
MOISTURE CONTENT Weight of Sample (moist) 6788G Weight of Sample (dry) 6513G Moisture Loss 275G % Moisture 4.2%							Weight of Total Sample (dry, unwashed) 6513 Weight of R4.75 mm (No. 4) dry, unwashed 3879 = 0. 596 (A) Weight of P4.75 mm (No. 4) dry, unwashed 2634 = 0. 404 (B)						
R-4.75 mm (R-4) MATERIAL				P-4.75 mm (P-4) MATERIAL Wt. = 674 (Min. 500 g)			TOTAL MATERIALS (% Passing)						
Sieve	Weight Retained	% Retained	% Pass (C)	Weight Retained	% Retained	% Pass (D)	4.75 mm (R-4) (A)(C)	4.75 mm (P-4) (B)(D)	Washed Results			Spec	
75mm (3")	0	0	100	0	0	100	59.6	40.4	100				
37.5mm (1-1/2")	0	0	100	0	0	100	59.6	40.4	100				
32.5mm (1 1/4")	98	2.5	97.5	0	0	100	58.1	40.4	98.5			95-100	
25 mm (1")	153	3.9	96.1	0	0	100	57.2	40.4	97.6				
19 mm (3/4")	1101	28.3	71.7	0	0	100	42.7	40.4	83.1			70-93	
12.5 mm (1/2")	1798	46.3	53.7	0	0	100	32.0	40.4	72.6				
9.5 mm (3/8")	2471	64.2	35.8	0	0	100	21.3	40.4	61.7			42-80	
4.75 mm (No. 4)	3738	96.4	3.6	0	0	100	2.1	40.4	42.5			25-63	
2 mm (No. 10)	3796	97.9	2.1	233	34.6	65.4	1.3	26.4	27.7			16-48	
425 µm (No. 40)	3800	98.0	2.0	415	61.6	38.4	1.2	15.5	16.7			8-28	
75 µm (No. 200)	3813	98.3	1.7	531	78.8	21.2	1.0	8.6	9.6			2-12	
In pan	19												
R-4.75 mm (R-4) FRACTURE COUNT				PLASTICITY CHECK				Mass/m ³ (Weight/c.y.) = _____					
Fracture Particles 30.2 Questionable Particles Total particles 413 % Fracture 73				Can 425 µm (P-40) be rolled into 3.2 mm (1/8") thread when moist? <input type="checkbox"/> Yes <input type="checkbox"/> No									
NOTE: If test does not meet contract requirement notify Project Engineer and indicate the action taken.													
Sampled by Gormon Thomas				Date 5/28/09		Tested by Paul Molitor				Date 6/1/09			

Gradation of aggregate should be expressed in percent passing sieve sizes. Separate charts must be kept for 2", 1-1/2", 1", 3/4", 1/2", 3/8", #4, #8, #10, #16, #30, #40 #50, #100 and #200 (50mm, 37.5mm, 25mm, 19mm, 12.5mm, 9.5mm, 4.75mm, 2.36mm, 2.00mm, 1.18mm, 600µm, 425µm, 300µm, 150µm and 75µm). Control charts for only the sieve sizes specified by the applicable specification need to be produced.

834.1.4 Atterberg Limits

Record Atterberg Limits test results.

834.1.5 Fractured Particle Count

Fractured particle testing must be according to [WTM D5821](#). The QC tester should make the required calculation. Fractured particle test results must be plotted on a control chart.

834.2 Department Testing

Verification and independent assurance sampling and testing will be performed by the department or a department representative.

834.2.1 Verification Testing

Verification testing will be performed by an HTCP certified department representative on random samples collected independently of the contractor's samples. Testing of the material will be conducted in a separate laboratory and with separate equipment from the contractor's tests.

Transport base aggregate samples to the department's regional laboratory the same day as the samples were collected. The regional laboratory requires at least one business day to complete the tests (two business days for material classified with recycled asphalt). If samples cannot be transported the same day, ensure samples arrive the following morning during normal business hours. Results will be reported on the material tracking system.

Ideal sampling and transportation examples include:

- Aggregate sampled on a Friday. Sample was transported to the laboratory by mid-Friday. Test procedures were conducted in the laboratory and results were posted on the Material Tracking System by close of business on Monday. The engineer reported results to the contractor by the close of business on Tuesday.
- Aggregate sampled on Monday. Aggregates were transported to the laboratory on Tuesday morning. Test procedures were conducted in the laboratory and results were posted on the Materials Tracking System on Wednesday. The engineer reported results to the contractor by the close of business on Wednesday.
- Aggregate sampled on Tuesday morning. Sample was transported to laboratory on Tuesday. Test procedures were conducted in the laboratory and results were posted on the Materials Tracking System on Wednesday. The engineer reported results to the contractor by the close of business on Thursday.
- Aggregate Sampled on Saturday. Sample was transported to the laboratory over the weekend. Test procedures were conducted in the laboratory and results were posted on Material Tracking System on Tuesday. The engineer reported results to the contractor by the close of business on Tuesday.

It is the project staff's responsibility to make sure samples are transported to regional labs in a timely manner. Region staff can assist with transporting the sample. However, people affiliated with the project's contractor(s) cannot transport verification samples.

Consider a regional laboratory's workload throughout the construction season. High sample volumes can cause reporting delays if samples are not transported on the same day as sampling.

834.2.2 Independent Assurance Review

Independent assurance reviews will be conducted by a department representative. These reviews will be made of the contractor's quality control and the department's verification sampling and testing equipment and personnel.

834.3 Dispute Resolution

Split samples of the material collected for QC testing can be used to help resolve conflicts. Using these samples will be as agreed to by the contractor and the department.