MnDOT Guidance for Gradation Testing and Acceptance

MnDOT Specification 2461.2.G.6.a defines the requirements for Aggregate Gradation Acceptance. MnDOT will use a moving average of 4 Producer gradations for acceptance. This does not apply to Job Mix Formulas (JMF) gradations.

1. The Producer is required to run gradations and verification companion gradations at a rate specified in the Schedule of Materials Control.

2. The Agency is required to run verification gradations at a rate specified in the Schedule of Materials Control.

3. The Producer is required to chart the Producer and MnDOT gradation test results for each specification sieve on the MnDOT Aggregate Gradation Control Charts. The aggregate gradation control charts can be found on the Concrete Engineering Website at http://www.dot.state.mn.us/materials/certifiedrm.html

4. There is a tab for each material type and fraction the Producer is using when producing Agency concrete.
5. The Agency should check the Control Charts each time they visit the certified ready-mix plant. The Producer should notify the Agency immediately if they have a moving average failure.

**All Passing Gradation Results:** If there are not any gradation failures at the ready-mix plant supplying concrete to your project, the aggregate gradation acceptance requirements have been met.

**Individual Gradation or Moving Average Failures:** However, if there are individual gradation failures or moving average failures, document as Materials Exceptions and provide a resolution on the Materials Exception Summary. Table 2461-14 explains what actions are required for gradation failures.
Let’s take a closer view of the results:

**Example #1**
For Sample #9, the Producer verification companion results are 55% and the Agency verification results are 56%.
- Even though the Agency results are outside of the #67 gradation limits, the results are within Lab-Field Tolerance in accordance with Table 2461-16, so the Producer results are acceptable and can be used in the moving average calculation.

**Example #2**
For Sample #10, the Producer results are 58%, this requires action by the Producer.
- The Producer is required to immediately take another gradation
- The Producer completed a second gradation 1 hour after the first gradation was completed.
- In this case, the Producer’s second gradation passed so they can resume testing at the specified rate.
- No monetary adjustment applies to the individual gradation failure, however a moving average failure may occur due to the failing gradation which may result in a monetary adjustment

**Example #3**
The running average from Samples 9, 10, 11, 12 have caused a moving average failure, this requires immediate action by the Producer.
- Stop production and contact Engineer
- Determine the cause of continual borderline or failing material
- Resume production when corrective action results in a passing gradation
- Increase gradation testing at a rate of 1 per 100 cubic yards until the moving average is within the gradation limits

**Determine and Document Monetary Adjustment:**
The Engineer determined that the concrete represented by samples 9, 10, 11, 12 represented 190 cubic yards of concrete.
- Per Table 2461-15, the monetary adjustment is $500 or $5 per cubic yard, whichever is greater.
- 190 cubic yards x $5 = $950
  - Since $950 is greater than $500, the Engineer will assess of monetary adjustment as a backsheet item: Concrete Curb and Gutter B624 Gradation Failure -$950.00