

## 730 QMP Base Aggregate

### 730.1 Description

#### 730.1.1 General

- (1) This section describes contractor QC and department QV testing and documentation for base aggregates. Apply to Base Aggregate Open Graded bid items and to Base Aggregate Dense bid items except reclaimed asphaltic pavement placed under the Base Aggregate Dense bid items.
- (2) Do not apply to Aggregate Detours, Breaker Run, Select Crushed, Pit Run, Subbase, or Riprap bid items.
- (3) Conform to the general QMP requirements under [701](#), to the base aggregate requirements under [301](#), [305](#), and [310](#), and to the additional requirements specified here in 730.

#### 730.1.2 Quality Control Program

##### 730.1.2.1 Quality Control Plan

- (1) Submit a plan conforming to [701.1.2.2](#) and include additional information as follows:
  1. Section and quarter descriptions for all aggregates that require QC testing.
  2. Description of stockpiling and hauling methods.

##### 730.1.2.2 Small Quantities

- (1) The department defines a small quantity of base aggregate as a contract quantity of 6000 tons or less placed under a single bid item.
- (2) For small quantity contracts:
  - An abbreviated quality control plan is allowed under [701.1.2.3](#).
  - Contractor QC placement testing is modified as specified in [730.3.4.1](#).

##### 730.1.2.3 Documentation

- (1) Submit gradation, fracture, liquid limit, and plasticity test results to the engineer within 1 business day of obtaining the sample and submit data electronically using MRS as specified in [701.1.2.7](#).
- (2) Maintain standardized control charts according to [CMM 830](#).
- (3) Maintain separate gradation control charts for each sieve size specified in [305](#) or [310](#) for each base aggregate size, source or classification, and type. Set the control limits and warning limits as follows:
  1. The control limits are the upper and lower gradation specification limits.
  2. Warning limits:
    - There are no upper warning limits for sieves requiring or allowing 100 percent passing.
    - There are no lower warning limits for sieves allowing 0 percent passing.
    - Dense-graded No. 200 sieve: warning limits are 0.5 percent within the upper and lower control limits.
    - Dense-graded for all other sieves: warning limits are 2 percent within the upper and lower control limits.
    - Open-graded 1-inch, 3/8-inch, and No. 4 sieves: warning limits are 2 percent within the upper and lower control limits.
    - Open-graded No. 10, No. 40, and No. 200 sieves: warning limits are 1 percent within the upper and lower control limits.
- (4) Maintain a separate fracture control chart for each base aggregate size, source or classification, and type. Set the lower control limit to the value specified in table 301-2. Set the lower warning limit 2 percent above the lower control limit. There is no upper warning limit.
- (5) Plot QC and QV test results and the 4-point running average on control charts. Include only QC placement tests in the running average unless a QV test result is out of spec, then include it as specified in [730.3.5](#)(5). Document corrective action on control charts. Update control charts and submit copies to the engineer daily.

### 730.2 Materials

- (1) Provide materials conforming to [301](#), [305](#), and [310](#).
- (2) Use the definitions in [301.2.2](#) and the following:

**Stockpile Sampling** Coordinated QC or QV sample before beginning placement of aggregate materials.

**Loadout Sampling** Sample taken from the working face of a stockpile during placement of aggregate materials.

## 730.3 Testing

### 730.3.1 General

- (1) Test gradation, fracture, liquid limit, and plasticity for each base aggregate size, source or classification, and type. Production tests only apply to small quantity projects under [730.3.4](#). Use the test methods specified in table 701-1 and conform to the following:
  1. Gradation
    - Determine the complete gradation, including P200, using a washed analysis.
    - For 3-inch base, if three consecutive 4-point running averages for percent passing the No 200 sieve are 8.5 percent or less, the contractor may use an unwashed analysis for 9 out of 10 tests; one out of every 10 must be washed. If a single 4-point running average for percent passing the No. 200 sieve exceeds 8.5 percent, resume using a washed analysis until three consecutive running averages are 8.5 percent or less.
  2. Fracture
    - Perform fracture testing on the individual component materials before blending.
    - Fracture testing is not required on material classified as quarried stone, reclaimed asphalt, reprocessed material, or recycled concrete.
  3. Liquid limit and plasticity
    - Determine the liquid limit and plasticity index using material passing the No. 40 sieve of each individual component material and then on the blended material.
    - Perform plasticity checks, as specified under [730.3.2](#), by using the Hand Rolling Method detailed in section 5 of [AASHTO T90](#).
    - Liquid limit and plasticity testing are not required on reclaimed asphalt or reprocessed material.
- (2) Ensure that both QC and QV stockpile test results conform to the specifications before placing material. If either the QC or the QV test fails, both the QC and QV technicians will resample the stockpile side-by-side and rerun the tests. If either side-by-side test fails, submit a written description of corrective action taken. If the corrective action results in a passing process control test, the department will retest to confirm that the resulting material is conforming.
- (3) Stockpile tests<sup>[1]</sup> can be used for multiple projects. If placement on a project does not begin within 120 calendar days after the date the stockpile sample was obtained, retest the stockpile before placement begins.

<sup>[1]</sup> Replace the stockpile test with an in-place production test for concrete pavement recycled and processed on-site; test on the first day of production.
- (4) Obtain placement samples after the material is bladed, mixed, and shaped, but before watering and compacting, except as follows:
  1. Sample 3-inch material and lift thicknesses of 3-inch or less from the stockpile at loadout.
  2. Do not sample from material used to maintain local traffic or from other areas of temporary base that will not remain in place after the contract.
  3. No placement testing is required on days when only temporary base material is placed. Acceptance of temporary base materials is based on visual inspection.

### 730.3.2 Contractor QC Testing

- (1) Provide stockpile test results to the engineer before placing material.
- (2) Split and label each QC sample. Retain the split for 10 calendar days in a dry, protected location. If requested for department comparison testing, deliver the split to the engineer within one business day.
- (3) Perform QC gradation, fracture, liquid limit, and plasticity testing of each base aggregate size, source or classification, and type at the following frequencies:
  - One stockpile test before placement including gradation, fracture, liquid limit, and plasticity.
  - Conduct one gradation test per lot. One lot is defined as 3000 tons of material placed. The contractor may include partial quantities of less than or equal to 750 tons with the previous lot. For partial lots exceeding 750 tons, notify the engineer who will direct additional testing to represent that partial lot.
  - One fracture test for each gradation test. When the fracture 4-point running average is above the lower warning limit, the testing frequency may be reduced to one fracture test per ten gradation tests or fraction thereof. The reduced test frequency applies only as long as the running average remains above the lower warning limit.
  - One plasticity and liquid limit test for the first gradation test. Thereafter, perform one plasticity check, per ten gradation tests or fraction thereof. If the soil cannot be rolled into a 3 mm-diameter thread, then it is non-plastic (NP) and the complete test need not be performed; report the plasticity Index as NP. If the

material can be rolled into a thread, then perform both complete tests to determine the liquid limit and the plasticity index.

- (4) Submit test results to the engineer within 1 business day of sampling, except an aggregate classification with recycled asphalt may be submitted within 3 business days of sampling.

### **730.3.3 Department QV Testing**

- (1) The department will notify the contractor's project materials coordinator before obtaining a sample.
- (2) The department will split each sample, test half for QV, and retain the other half for 10 calendar days.
- (3) The department will conduct QV testing for gradation, fracture, liquid limit, and plasticity of each base aggregate size, source or classification, and type as follows:
  1. One stockpile QV test from each source before placement.
  2. At least one QV test per 15,000 tons of material placed, or fraction thereof.
- (4) The department will provide test results to the contractor within 2 business days of sampling, or for an aggregate classification with recycled asphalt, within 3 business days of sampling.

### **730.3.4 Small Quantity Testing**

#### **730.3.4.1 Contractor QC Testing**

- (1) For small quantity contracts with  $\leq 750$  tons, submit two (2) gradation, fracture, liquid limit, and plasticity production tests or conduct one (1) QC gradation, fracture, liquid limit, and plasticity stockpile test before placement. Production tests are valid for 3 years from the date the production sample was obtained. Begin placement within 3 years of the date sampled.
- (2) For small quantity contracts with  $\leq 6000$  tons and  $>750$  tons, do the following:
  1. Conduct one (1) QC stockpile test before placement including gradation, fracture, liquid limit, and plasticity.
  2. Submit two (2) gradation, fracture, liquid limit, and plasticity production tests or conduct one (1) QC gradation, fracture, liquid limit, and plasticity loadout test instead of placement tests. Production tests are valid for 3 years from the date the production sample was obtained; the first day of placement must be within 3 years of the date sampled.
  3. If the actual quantity placed is more than 6000 tons, on the next day of placement perform one (1) additional random QC gradation, fracture, liquid limit, and plasticity test for each 3000 tons of overrun, or fraction thereof.
- (3) Submit test results to the engineer within two (2) business days of sampling, except an aggregate classification with recycled asphalt may be submitted within 3 business days of sampling

#### **730.3.4.2 Department QV Testing**

- (1) The department will conform to [730.3.3](#) but may waive QV testing for contract bid item quantities of 6000 tons or less.

### **730.3.5 Corrective Action**

- (1) Do not blend additional material on the roadbed to correct gradation problems.
- (2) Consider corrective action when a running average trends toward a warning limit.
- (3) Notify the engineer when a running average exceeds a warning limit. When two consecutive running averages exceed a warning limit, the engineer and contractor will discuss appropriate corrective action. Perform the engineer's recommended corrective action and increase the testing frequency as follows:
  1. Increase gradation testing to at least one test per 1000 tons placed.
  2. Increase fracture testing to at least one fracture test for each gradation test.
- (4) If corrective action improves the property in question such that the running average is within the warning limits, the contractor may return to the testing frequency specified in [730.3.2](#). If corrective action does not improve the property in question, and the running average is still in the warning band, then repeat the steps outlined above starting with engineer notification.
- (5) If a QV test result does not conform to the specifications, the engineer will inform the contractor and the QV test will be added to the QC data and included in the running average, as if it were an additional QC test.
- (6) If a running average is never established, individual placement tests are used for acceptance.
- (7) If an individual QC or QV test result is significantly out of specification limits, notify the other party, stop placing base, suspend other activities that may affect the area in question, and jointly investigate to determine the extent of nonconforming material. Both parties must document the investigative work.
- (8) Test results are considered significantly out of spec limits if meeting one or more of the following:

1. A gradation spec limit for the No. 200 sieve is exceeded by more than 3.0 percent.
  2. A gradation spec limit for any sieve, other than the No. 200, is exceeded by more than 5 percent.
  3. The fracture spec limit is exceeded by more than 10 percent.
- (9) The engineer may direct the contractor to remove and replace any nonconforming material. If the engineer allows the nonconforming material to remain in place, it is subject to a pay reduction.

### 730.3.6 Nonconforming Material

- (1) The department will determine the extent of nonconforming material as follows:
1. If an individual QC or QV gradation or fracture test is out of spec and a 4-point running average is never established, the material starting from the first out-of-spec QC or QV test and ending at the first subsequent QC or QV test that is within spec limits is nonconforming.
  2. If a gradation or fracture 4-point running average exceeds a control limit, the material starting from the first running average outside of the control limit and ending at the first subsequent running average that is within the control limit is nonconforming.
  3. If any individual QC or QV plasticity test is out of spec, the material starting from the first out-of-spec QC or QV test and ending at the first subsequent QC or QV test that is within spec limits is nonconforming.
  4. If an individual QC or QV gradation or fracture test is significantly out of spec, the material starting from the first significantly out-of-spec QC or QV test and ending at the first subsequent QC or QV test that is within spec limits is nonconforming, even if the 4-point running average, that includes the significantly out-of-spec test, is within spec limits.

### 730.4 (Vacant)

### 730.5 Payment

- (1) The department will administer pay reductions for nonconforming material under the Nonconforming QMP Base Aggregate Gradation, Nonconforming QMP Base Aggregate Fracture, and Nonconforming QMP Base Aggregate Plasticity administrative items.
- (2) The department will calculate pay reductions for base aggregate with nonconforming gradation and fracture using the nonconforming quantity that remains in place, the bid item contract unit price, and a pay reduction percentage from table 730-1. The department will administer a 50 percent pay reduction for base aggregate with nonconforming plasticity or liquid limit that remains in place.

**TABLE 730-1 Pay Reductions for Nonconforming Base Aggregate**

% PAY REDUCTION	NONCONFORMING GRADATION		NONCONFORMING FRACTURE
	NO 200 SIEVE	SIEVES OTHER THAN NO 200	
5% to 10%	<= 1.5%	<= 3%	<= 5%
10% to 20%	> 1.5% to <= 3%	> 3% to <= 5%	> 5% to <= 10%
SIGNIFICANTLY OUT OF SPEC <sup>[1]</sup>			
20% to 40%	> 3%	> 5%	> 10%

<sup>[1]</sup> The engineer may assess pay reductions for individual QC or QV test results that are significantly out of spec even if the running average is within spec limits.

- (3) The department will not apply more than one pay adjustment to a given quantity of material. If a quantity of material is nonconforming in more than one property, the department will apply the greater pay reduction.