207.06—Referee System for Select Material, Type I.

If the test results obtained for one of the four samples or the mean of the four samples tested to evaluate a particular lot is questionable, the referee system as defined in Section 208.07 will be applied except that the final mean results will be compared to the job-mix formula with the tolerances given in Tables II-7 and II-8 for the mean of eight tests.

207.07—Payment Adjustment System for Select Material, Type I.

If a lot of material does not conform to the acceptance requirements stated herein, adjustment points, determined as follows, will be applied for each 1 percent or part thereof that the grading or Atterberg limits are outside the job-mix formula with the tolerances given in Tables II-7 and II-8.

	Adjustment Points	
Sieve Size	**Process**	**Range**
3 in	1	1
2 in	1	1
No. 10	1	1
No. 40	3	3
No. 200	5	5

Atterberg Limits	**Adjustment Points**
Liquid limit	3
Plasticity index	7

If the total adjustment (excluding the range adjustment) for the lot is more than 25 points, the failing material shall be removed from the road. If the total adjustment (excluding the range adjustment) is 25 points or less and the Contractor does not elect to remove and replace the material, the contract unit price for the material will be reduced by 1 percent for each adjustment point. The total adjustment will be applied to the tonnage represented by the sample(s).

SECTION 208—SUBBASE AND AGGREGATE BASE MATERIAL

208.01—Description.

These specifications cover material used to form a foundation for base or surface pavement.

TABLE II-9
Design Range for Dense Graded Aggregates

Size No.	Amounts Finer Than Each Laboratory Sieve (Square Openings*) (% by Weight)					
	2 in	1 in	3/8 in	No. 10	No. 40	No. 200
21A	100	94–100	63–72	32–41	14–24	6–12
21B	100	85–95	50–69	20–36	9–19	4–7
22	—	100	62–78	39–56	23–32	8–12

*In inches, except where otherwise indicated. Numbered sieves are those of the U. S. Standard Sieve Series.

208.02—Materials.

(a) **Subbase material** shall consist of mixtures of natural or crushed gravel, crushed stone or slag, and natural or crushed sand; with or without soil mortar.

(b) **Aggregate base material** will be designated as Type I or Type II as follows: **Type I** shall consist of crushed stone, crushed slag, or crushed gravel, with or without soil mortar or other admixtures. Crushed gravel shall consist of particles of which at least 90 percent by weight of the material retained on the No. 10 sieve shall have at least one face fractured by artificial crushing. **Type II** shall consist of gravel, stone, or slag screenings; fine aggregate and crushed coarse aggregate; sand-clay-gravel mixtures; or any combination of these materials; with or without soil mortar or other admixtures.

208.03—Detail Requirements.

(a) **Grading:** Grading shall conform to the requirements of the job-mix formula selected from within the design range specified in Table II-9, subject to the applicable tolerances specified in Table II-10 when tested in accordance with the requirements of VTM-25

TABLE II-10
Process Tolerances for Each Laboratory Sieve (%)

No. Tests	Top Size	1 in	3/4 in	3/8 in	No. 10	No. 40	No. 200
1	0.0	±10.0	±14.0	±19.0	±14.0	±8.0	±4.0
2	0.0	±7.1	±10.0	±13.6	±10.0	±5.7	±2.9
3	0.0	±5.6	±7.8	±10.6	±7.8	±4.4	±2.2
4	0.0	±5.0	±7.0	±9.5	±7.0	±4.0	±2.0
8	0.0	±3.6	±5.0	±6.8	±5.0	±2.9	±1.4

TABLE II-11
Atterberg Limits

Max. Liquid Limit		Max. Plasticity Index	
No. Tests	Subbase and Aggregate Base Type I and II	Subbase Sizes No. 21A, 22 and Aggregate Base Type II	Aggregate Base Type I and Subbase Size No. 19
1	25.0	6.0	3.0
2	23.9	5.4	2.4
3	23.2	5.1	2.1
4	23.0	5.0	2.0
8	22.4	4.7	1.7

(b) **Atterberg Limits:** Atterberg limits shall conform to the requirements of Table II-11 when tested in accordance with the requirements of VTM-7.

(c) **Soundness:** Soundness shall conform to the requirements of Table II-4 when tested in accordance with the requirements of AASHTO T103 or T104.

(d) **Abrasion Loss:** Abrasion loss shall be not more than 45 percent when tested in accordance with the requirements of AASHTO T96.

(e) **Optimum Moisture:** Material shall be produced at optimum moisture ±2 percentage points.

(f) **Admixtures:** Admixtures shall conform to the applicable specifications.

208.04—Job-Mix Formula.

The Contractor shall submit, or shall have the source of supply submit, for the Engineer's approval, a job-mix formula for each mixture to be supplied for the project prior to starting work. The formula shall be within the design range specified in Table II-9. If unsatisfactory results or other conditions make it necessary, the Contractor shall prepare and submit a new job-mix formula for approval.

208.05—Mixing.

Subbase or aggregate base materials shall be mixed in an approved central mixing plant of a pugmill or other mechanical type. Materials shall be blended prior to or during mechanical mixing in a manner than will ensure conformance to the specified requirements.

Preparation of subbase and aggregate base material will be subject to inspection at the plant. The Contractor shall provide a laboratory as specified in Section 106.07.

During the initial setup and subsequent production, the Contractor shall have a certified Central Mix Aggregate Technician present at the plant.

208.06—Acceptance.

The Contractor shall provide the quality assurance necessary for the Engineer to determine conformance to the required grading and Atterberg limits of subbase and aggregate base material.

Sampling and testing for determination of grading and Atterberg limits shall be performed by the Contractor. The Contractor shall provide copies of test results to the Department on forms furnished by the Department and shall maintain appropriate current quality control charts. The Department will perform independent monitor tests at a laboratory of its choice. If there is a statistically significant difference in the two sets of results, an investigation will be made to determine the reason for the difference. If it is determined that the material does not conform to the requirements of the Contract, the material will be rejected or a payment adjustment will be made in accordance with the requirements of Section 208.08.

Determination of grading and Atterberg limits will be based on a mean of the results of tests performed on four samples taken in a stratified random manner from each 2,000 ton lot. Lots of 4,000 tons may be used when the normal daily production of the source from which the material being obtained is more than 2,000 tons. Samples shall be obtained from the approximate center of randomly selected quadrants of truckloads of material. Any statistically acceptable method of randomization may be used to determine the time and location of the stratified random sample to be taken. The Department shall be advised of the method to be used prior to the beginning of production.

A lot will be considered acceptable for grading if the mean of the test results is within the deviation from the job-mix formula specified in Table II-10.

A lot will be considered acceptable for Atterberg limits if the mean of the test results is less than the maximum for the liquid limit and plasticity index specified in Table II-11.

If the liquid limit exceeds 30 or the plasticity index exceeds 6 for Type I base material or No. 19 subbase material; or the plasticity index exceeds 9 for Type II base material or subbase materials No. 20, 21, 21A, 21B, or 22 on any individual sample; that portion of the lot from which the sample was taken will be considered a separate part of the lot and shall be removed from the road.

If either the amount of material in the lot is less than 2,000 tons (4,000 tons if applicable), the job-mix formula is modified within a lot, or a portion of the lot is rejected on the basis of individual test results, the mean test results of the samples taken will be compared to the job-mix formula with the tolerances given in Tables II-10 and II-11 for the number of tests performed.

If a visual examination reveals that material in any load is obviously contaminated or segregated, the load will be rejected without additional sampling or testing of the lot. If it is necessary to determine grading or Atterberg limits of material in an individual load, one sample (taken from the load) will be tested and the results compared to the job-mix formula with the tolerances given in Tables II-10 and II-11 for one test. Results obtained in the testing of a specific individual load will apply only to the load in question.

208.07—Referee System.

If the test results obtained for one of the four samples taken to evaluate a particular lot are questionable, the Contractor may request that the results of the questionable sample be disregarded. The Contractor shall then perform tests on five additional samples taken from randomly selected locations in the roadway where the lot was placed. If the Engineer determines that one of the four test results is questionable, the Department will perform tests on five additional samples taken from randomly selected locations in the roadway where the lot was placed. The test results of the three original (unquestioned) samples will be averaged with the tests results of the five road samples, and the mean of the test values obtained for the eight samples will be compared to the job-mix formula with the tolerances specified in Tables II-10 and II-11 for the mean of eight tests.

If the Contractor questions the mean of the four original test results obtained for a particular lot, he may request approval to perform additional testing of that lot. If the Contractor requests further tests, he shall sample and test the material in accordance with procedures approved by the Department. If the Engineer determines that the mean of the four original test results is questionable, the Department will perform additional testing of that lot. The test results of the original four samples will be averaged with the test results of the four additional samples taken from randomly selected locations in the roadway where the lot was placed, and the mean of test values obtained for the eight samples will be compared to the job-mix formula with the tolerances specified in Tables II-10 and II-11 for the mean result of eight tests.

If the mean of the test values obtained for the eight samples conforms to the requirements for the mean of the results of eight tests, the material will be considered acceptable; if the mean does not conform, the lot will be adjusted in accordance with the payment adjustment rate specified in Section 208.08.

The provisions of this Section will not be applicable to mixtures containing cement or other admixtures that alter the characteristics of the material.

208.08—Payment Adjustment System.

If a lot of material does not conform to the acceptance requirements of Section 208.06, payment adjustment points will be determined as follows:

Sieve Size	Adjustment Points for Each 1% Grading Is Outside Tolerance Permitted in Table II-10
2 in	1
1 in	1
3/4 in	1
3/8 in	1
10	1
40	3
200	5

Atterberg Limits	Adjustment Points for Each 1% Atterberg Limits Exceed Maximum Permitted in Table II-11
Liquid limit	3
Plasticity index	7

If the total adjustment for the lot is more than 25 points, the failing material shall be removed from the road. If the total adjustment is 25 points or less and the Contractor does not elect to remove and replace the material, the unit price for the material will be reduced by 1 percent for each adjustment point. The adjustment will be applied to the tonnage represented by the sample(s).

The Contractor shall control the variability of his product in order to furnish a consistent, well-graded mixture. When the quantity of any one type of material furnished for a project exceeds 4,000 tons, the variability of the total quantity furnished will be determined on the basis of the standard deviation for each sieve size. If the standard deviation is within the limits specified in Table II-12, the contract unit price for the material will be adjusted as indicated hereinafter. Standard deviation computations will not be made separately on more than two job mixtures for the same type of material.

TABLE II-12
Standard Deviation

	No. of Payment Adjustment Points for Each Sieve Size		
Sieve Size	**1 Adjustment Point For Each Sieve Size**	**2 Adjustment Points For Each Sieve Size**	**3 Adjustment Points For Each Sieve Size**
2 in.	0.6–1.5	1.6–2.5	2.6–3.5
1 in	4.6–5.5	5.6–6.5	6.6–7.5
3/4 in	5.6–6.5	6.6–7.5	7.6–8.5
3/8 in	7.1–8.0	8.1–9.0	9.1–10.0
No. 10	5.6–6.5	6.6–7.5	7.5–8.5
No. 40	3.6–4.5	4.6–5.5	5.6–6.5
No. 200	3.1–4.0	4.1–5.0	5.1–6.0

The contract unit price will be reduced by 0.5 percent for each adjustment point applied for standard deviation.

The disposition of material having standard deviations larger than those given in Table II-12 will be as determined by the Engineer.

SECTION 209—OPEN GRADED SHOULDER MATERIAL

209.01—Description.

These specifications cover the requirements for open graded material used on roadway shoulders where designated.

209.02—Detail Requirements.

Open graded shoulder material shall be aggregate material No. 18 and shall consist of mixtures of natural or crushed gravel, crushed stone, or sand; without soil mortar.

(a) **Grading:** Grading shall conform to the following when tested in accordance with the requirements of VTM-25:

% by Weight of Material Passing Sieve					
2 in	**1 in**	**3/8 in**	**No. 10**	**No. 40**	**No. 200**
100	90 ± 10	55 ± 15	20 ± 10	8 ± 5	3 ± 3

(b) **Atterberg Limits:** Material shall be nonplastic, and the liquid limit shall be not more that 25 when tested in accordance with the requirements of VTM-7.

(c) **Soundness:** Soundness shall conform to the requirements of Table II-7 for subbase material when tested in accordance with the requirements of AASHTO T103 or T104.

(d) **Abrasion Loss:** Abrasion loss shall be not more than 45 percent when tested in accordance with the requirements of AASHTO T96.

209.03—Mixing.

Pugmill mixing will not be required for aggregate shoulder material No. 18. The Contractor shall provide a laboratory as specified in Section 106.07.