



SECTION 28 – AGGREGATE BASE COURSE (FAA P-208)

28-1 GENERAL

The Contractor shall perform all work required by the plans and specifications for construction of aggregate base course for, use under runway shoulder, taxiway shoulder and roadway pavement, in accordance with the Standard Specifications, except as specified otherwise in FAA Specification Item P-208, as included and modified hereafter, and as shown on the Plans.

[For base course under runway and taxiway surfaces, use Section 29, FAA Item P-209.]

[When approved by the Engineer, Processed Miscellaneous Base, conforming to Section 25 of these specifications may be used in lieu of P-208 for base courses under runway shoulder, taxiway shoulder and roadway pavement.]

ITEM P-208 AGGREGATE BASE COURSE

208-1.1 This item shall consist of a base course composed of crushed or uncrushed coarse aggregate, as specified in the bid schedule, bonded with either soil or fine aggregate or both. It shall be constructed on a prepared underlying course in accordance with these specifications and shall conform to the dimensions and typical cross section shown on the plans.

MATERIALS

208-2.1 UNCRUSHED COARSE AGGREGATE. The base course material shall consist of hard, durable particles or fragments of stone or gravel mixed or blended with sand, stone dust, or other similar binding or filler materials produced from approved sources. All oversized stones, rocks and boulders occurring in the pit or quarry material shall be wasted; those of acceptable quality may be crushed and become a part of the base material, provided the blend meets the specified gradations. The aggregate shall be free from vegetation, lumps, or excessive amounts of clay and other objectionable substances. The coarse aggregate shall have a percent of wear not more than 45 at 500 revolutions as determined by ASTM C 131.

208-2.2 CRUSHED COARSE AGGREGATE. The aggregates shall consist of both fine and coarse fragments of crushed stone, crushed slag, or crushed gravel mixed or blended with sand, screenings, or other similar approved materials. The crushed stone shall consist of hard, durable particles or fragments of stone and shall be free from excess flat, elongated, soft or disintegrated pieces, dirt, or other objectionable matter.



The crushed slag shall be air-cooled, blast furnace slag and shall consist of angular fragments reasonably uniform in density and quality and shall be reasonably free from thin, elongated, or soft pieces, dirt, and other objectionable matter. It shall weigh not less than 70 pounds per cubic foot as determined by ASTM C 29.

The crushed gravel shall consist of hard, durable stones, rock, and boulders crushed to specified size and shall be free from excess flat, elongated, soft or disintegrated pieces, dirt, or other objectionable matter. The method used in production of crushed gravel shall be such that the fractured particles occurring in the finished product shall be as nearly constant and uniform as practicable and shall result in a minimum of 60% of the material retained on the No. 4 sieve having at least 2 fractured faces and 75% having at least 1 fractured face.

If necessary to meet this requirement or to eliminate an excess of fine, uncrushed particles, the gravel shall be screened before crushing. All stones, rocks, and boulders of inferior quality in the pit shall be wasted.

The crushed coarse aggregate shall have a percent of wear not more than 50 at 500 revolutions as determined by ASTM C 131.

All material passing the No. 4 mesh sieve produced in the crushing operation of either stone, slag, or gravel shall be incorporated in the base material to the extent permitted by the gradation requirements.

208-2.3 GRADATION. *The gradation of the uncrushed or crushed material shall meet the requirements of one of the gradations given in Table 1 when tested in accordance with ASTM C 117, ASTM C 136, and ASTM D 422.*



TABLE 1. REQUIREMENTS FOR GRADATION OF AGGREGATE

Sieve Designation	Percentage by weight passing sieves		
	2" maximum	1-1/2" maximum	1' maximum
2 inch	100	--	--
1-1/2 inch	70-100	100	--
1 inch	55-85	70-100	100
3/4 inch	50-80	55-85	70-100
No. 4	30-60	30-60	35-65
No. 40	10-30	10-30	10-25
No. 200 (5-15	5-15	5-15

The gradations in the table represent the limits that shall determine suitability of aggregate for use from the sources of supply. The final gradations decided on within the limits designated in the table shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieves, or vice versa.

The amount of the fraction of material passing the No. 200 mesh sieve shall not exceed one-half the fraction passing the No. 40 mesh sieve. The aggregate blend shall not contain more than 3% material finer than 0.02 mm unless all materials are produced from crushed stone.

The portion of the filler and binder, including any blended material, passing the No. 40 mesh sieve have a liquid limit not more than 25 and a plasticity index not more than 6 when tested in accordance with ASTM D 4318.

The selection of any of the gradations shown in the table shall be such that the maximum size aggregate used in any course shall be not more than two-thirds the thickness of the layer of the course being constructed.

208-2.4 FILLER FOR BLENDING. If filler, in addition to that naturally present in the base course material, is necessary for satisfactory bonding of the material, for changing the soil constants of the material passing the No. 40 mesh sieve, or for correcting the gradation to the limitations of the specified gradation, it shall be uniformly blended with the base course material at the crushing plant or at the mixing plant. The material for such purpose shall be obtained from



sources approved by the Engineer and shall be of a gradation necessary to accomplish the specified gradation in the finally processed material.

The additional filler may be composed of sand, but the amount of sand shall not exceed 20% by weight of the total combined base aggregate. All the sand shall pass a No. 4 mesh sieve and not more than 5% by weight shall pass a No. 200 mesh sieve.

CONSTRUCTION METHODS

208-3.1 OPERATIONS IN PITS AND QUARRIES. *All work involved in clearing and stripping pits and quarries, including handling of unsuitable material, shall be performed by the Contractor. All material shall be handled in a manner that shall secure a uniform and satisfactory base product. The base course material shall be obtained from sources that have been approved.*

208-3.2 PREPARING UNDERLYING COURSE. *The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft, yielding places due to improper drainage conditions, hauling, or any other cause, shall be corrected and rolled to the required density before the base course is placed thereon.*

To protect the underlying course and to ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

208-3.3 METHODS OF PRODUCTION

a. Plant Mix. *When provided in the proposal, or when selected by the Contractor and approved by the Engineer, the base material shall be uniformly blended or mixed in an approved plant. The mixing plant shall include bins for storage and batching of the aggregate, pump and tanks for water, and batch mixers of either the pugmill or drum type. All mineral aggregates shall be batched into the mixer by weight. The agitation shall be such that a thorough dispersion of moisture is obtained. The size of the batch and the time of mixing shall be fixed by the Engineer and shall produce the results and requirements specified. The base course material produced by combining two or more materials from different sources shall be mixed in a mixing plant described herein. The mixture material shall be at a satisfactory moisture content to obtain maximum density.*

b. Travel Plant. *When the use of a traveling plant is allowed, the plant shall blend and mix the materials to meet these specifications. It shall accomplish a thorough mixing in one trip. The agitation shall be such that the*



dispersion of the moisture is complete. The machine shall move at a uniform rate of speed and this speed shall be regulated to fix the mixing time. If a windrow-type of travel plant is employed for mixing, the aggregate shall be placed in windrows parallel to the pavement centerline.

The windrow volume shall be sufficient to cover exact areas as planned. The windrow contents shall produce a mixture of the required gradation and bonding qualities. If a travel plant is used which is of the type that mixes previously spread aggregates in-place, the material shall have been spread in such thickness and proportions as may be handled by the machine to develop a base course of the thickness of each layer and of the gradation required. With either type of equipment, the mixed material shall be at a satisfactory moisture content to obtain the maximum density.

*c. **Materials of Proper Gradation.** When the entire base course material from coarse to fine is secured in a uniform and well-graded condition and contains approximately the proper moisture, such approved material may be handled directly to the spreading equipment. The material may be obtained from gravel pits, stockpiles, or produced from a crushing and screening plant with the proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The intent of this section of these specifications is to secure materials that will not require further mixing. The base material shall be at a satisfactory moisture content to obtain maximum density. Any minor deficiency or excess of moisture may be corrected by surface sprinkling or by aeration. In such instances some mixing or manipulation may be required immediately preceding the rolling to obtain the required moisture content. The final operation shall be blading, if necessary, to obtain a smooth uniform surface true to line and grade.*

208-3.4 PLACING.

a. The aggregate base material that is correctly proportioned, or has been processed in a plant, shall be placed on the prepared underlying course and compacted in layers of the thickness shown on the plans. The depositing and spreading of the material shall commence where designated and shall progress continuously without breaks. The material shall be deposited and spread in lanes in a uniform layer and without segregation of size to such loose depth that, when compacted, the layer shall have the required thickness. The base aggregate shall be spread by spreader boxes or other approved devices having positive thickness controls that shall spread the aggregate in the required amount to avoid or minimize the need for hand manipulation. Dumping from vehicles in piles that require rehandling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.



b. The aggregate base material that has been processed in a traveling plant, or mixed and blended in-place, shall be spread in a uniform layer of required depth and width and to the typical cross section. The spreading shall be by a self-powered blade grader, mechanical spreader, or other approved method. In spreading, care shall be taken to prevent cutting into the underlying layer. The material shall be bladed until a smooth, uniform surface is obtained, true to line and grade.

c. The base course shall be constructed in a layer not less than 3 inches nor more than 6 inches of compacted thickness. The aggregate as spread shall be of uniform grading with no pockets of fine or coarse materials. The aggregate, unless otherwise permitted by the Engineer, shall not be spread more than 2,000 square yards in advance of the rolling. Any necessary sprinkling shall be kept within these limits. No material shall be placed in snow or on a soft, muddy, or frozen course.

When more than one layer is required, the construction procedure described herein shall apply similarly to each layer.

During the mixing and spreading process, sufficient caution shall be exercised to prevent the incorporation of subgrade, subbase, or shoulder material in the base course mixture.

208-3.5 COMPACTION. *Immediately upon completion of the spreading operations, the aggregate shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density.*

The moisture content of the material during placing operations shall not be below, nor more than 2 percentage points above, the optimum moisture content as determined by ASTM 3017.

208-3.6 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY. *Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2400 square yards. A lot will consist of one-half day's production where a day's production is expected to consist of between 2400 and 4800 square yards.*

Each lot shall be divided into two equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665.

Each lot will be accepted for density when the field density is at least 100 percent of the maximum density of laboratory specimens prepared from samples of the material delivered to the jobsite. The specimens shall be compacted and tested in



accordance with ASTM D 1557. The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167. If the specified density is not attained, the entire lot shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached.

208-3.7 SURFACE TEST. After the course has been completely compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified, reshaped, recompacted, and otherwise manipulated as the Engineer may direct until the required smoothness and accuracy are obtained. The finished surface shall not vary more than 3/8 inch from a 16-foot straightedge when applied to the surface parallel with, and at right angles to, the centerline.

208-3.8 THICKNESS. The thickness of the base course shall be determined by depth tests or cores taken at intervals in such manner that each test shall represent no more than 300 square yards. When the base deficiency is more than 1/2 inch, the Contractor shall correct such areas by scarifying, adding satisfactory base mixture, rolling, sprinkling, reshaping, and finishing in accordance with these specifications. The Contractor shall replace, at his/her expense, the base material where borings have been taken for test purposes.

208-3.9 PROTECTION. Work on the base course shall not be accomplished during freezing temperatures nor when the subgrade is wet. When the aggregates contain frozen materials or when the underlying course is frozen, the construction shall be stopped.

Hauling equipment may be routed over completed portions of the base course, provided no damage results and provided that such equipment is routed over the full width of the base course to avoid rutting or uneven compaction. However, the Engineer in charge shall have full and specific authority to stop all hauling over completed or partially completed base course when, in his/her opinion, such hauling is causing damage. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at his/her own expense.

208-3.10 MAINTENANCE. Following the completion of the base course, the Contractor shall perform all maintenance work necessary to keep the base course in a condition satisfactory for priming. After priming, the surface shall be kept clean and free from foreign material. The base course shall be properly drained at all times. If cleaning is necessary, or if the prime coat becomes disturbed, any work or restitution necessary shall be performed at the expense of the Contractor.

Before preparations begin for the application of a surface treatment or for a surface course, the base course shall be allowed to partially dry until the average



moisture content of the full depth of base is less than 80% of the optimum moisture of the base mixture. The drying shall not continue to the extent that the surface of the base becomes dusty with consequent loss of binder. If during the curing period the surface of the base dries too fast, it shall be kept moist by sprinkling until such time as the prime coat is applied as directed.

The Contractor shall remove all survey and grade hubs from the base courses prior to placing any bituminous surface course.

METHOD OF MEASUREMENT

208-4.1 See Section 28-2.

BASIS OF PAYMENT

208-5.1 See Section 28-3.

TESTING REQUIREMENTS

<i>ASTM C 29</i>	<i>Unit Weight of Aggregate</i>
<i>ASTM C 117</i>	<i>Materials Finer than 75μm (No. 200) Sieve in Mineral Aggregates by Washing</i>
<i>ASTM C 131</i>	<i>Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine</i>
<i>ASTM C 136</i>	<i>Sieve Analysis of Fine and Coarse Aggregates</i>
<i>ASTM D 422</i>	<i>Particle Size Analysis of Soils</i>
<i>ASTM D 698</i>	<i>Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 kg) Rammer and 12-in (305 mm) Drop</i>
<i>ASTM D 1556</i>	<i>Density of Soil in Place by the Sand-Cone Method</i>
<i>ASTM D 1557</i>	<i>Test for Laboratory Compaction Characteristics of Soil Using Modified Effort</i>
<i>ASTM D 2167</i>	<i>Density of Soil in Place by the Rubber-Ballon Method</i>
<i>ASTM D 3665</i>	<i>Random Sampling of Paving Materials</i>



ASTM D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils

END OF ITEM P-208

28-2 METHOD OF MEASUREMENT

The quantity of uncrushed or crushed aggregate base course to be paid for shall be the number of cubic yards of base course material placed, bonded, and accepted in the completed base course. The quantity of base course material shall be measured in final position based upon depth test, or cores taken as directed by the Engineer, or at the rate of 1 depth test for each 300 square yards of base course, or by means of average end areas on the complete work computed from elevations to the nearest 0.01 foot. On individual depth measurements, thicknesses more than 1/2 inch in excess of that shown on the plans shall be considered as specified thickness plus 1/2 inch in computing the yardage for payment. Base materials shall not be included in any other excavation quantities.

28-3 BASIS OF PAYMENT

Payment shall be made at the contract unit price per cubic yard for aggregate base course of the type noted in the bid schedule. This price shall be full compensation for furnishing all materials and for all operations, hauling, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

No separate payment will be made for constructing the item under construction sequencing restrictions, including limited access or nighttime work areas.

Payment will be made under:

Item 28.1 ~~Crushed~~~~Uncrushed~~ Aggregate Base Course – P-208.....per cubic yard

END OF SECTION 28



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