READ THIS FIRST

The Engineer shall verify that the latest version of the Federal Aviation Administration Advisory Circular AC 150/5370-10, “Standards for Specifying Construction Of Airports” and that the latest version of the Federal Aviation Administration, Northwest Mountain Region Revision to AC 150/5370-10, “Standards for Specifying Construction Of Airports” are incorporated into this specification.

This Project Spec Document may need additional modifications to suit your project. It is recommended that you proofread each section, paying attention to any “Notes” boxes such as this one--you should remove these “Notes” sections as you go. Also, do a search for all bracket characters “ [ ] “ as they are used to show you areas containing options or project specific details (you can use Microsoft Word’s Find feature {Ctrl-F} to jump to an open bracket “ [ “ character quickly). Again, these bracket characters should be removed.

It is important that every paragraph be numbered to allow for easy referencing. If you use the document’s built in styles and formatting your outline should be fine (turn on the formatting toolbar by going to View > Toolbars > Formatting). Most paragraphs will use the style “Numbered Material” and can be promoted (Shift) or demoted (Shift-Tab).

You should not have to manually enter extra spaces, carriage returns or outline characters such as A, B, C, or 1.01, 1.02; the formatting will do this for you. The entire document is 11 pt. Arial. If you paste items in, you may need to reapply the “Numbered Material” format.

1. GENERAL
   1. SUMMARY OF WORK
      1. The location and extent of “Aggregate Base Course (FAA)” Work is indicated in the Contract Documents. Aggregate Base Course shall be provided on a prepared underlying course or prepared subgrade in accordance with the provisions of FAA Item P-208, Aggregate Base Course, attached hereto.
   2. GOVERNING CODES, STANDARDS, AND REFERENCES
      1. TBD
   3. SUBMITTALS
      1. Submit materials data in accordance with Section 01 33 00 - Submittals. Furnish manufacturers’ technical literature, standard details, product specifications, and installation instructions for all products.
      2. Submittals shall include the following:
2. NOT USED
3. NOT USED
4. NOT USED

End of Section

Revision History:

05/01/2014 Conversion to 2004 CSI Numbering System

10/15/2014 Added Sole Source and Salient Characteristics Note to Part 2 and revisions

# ITEM P-208 AGGREGATE BASE COURSE

Note to Engineer: Recycled asphalt has been used in place of P-208 material. This is acceptable provided it is approved by the Airport District Office and no more than 50% is blended with new P-208 material. Even though it can be compacted to a modified proctor, it bridges between coated particles and resists compactive effort. With time, under heavy loads and heat, it will deform. Recycled P-402 should not be in base course since it is gap-graded.

208-1.1 This item shall consist of a base course composed of [crushed] coarse aggregate 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

A. If only one product is acceptable (single or sole source product), obtain an approved Competition Waiver and submit to the CPO Construction, Contract Administrator. The language shall read as: “Manufacturer Name, Product # XXXXX, No Equal.” Refer to CPO-6 Competition Waiver Policy for more information.

B. If a Competition Waiver is not approved or more than one product is acceptable, this section must list a minimum of 2 products plus the language “Or Approved Equal,” along with salient characteristics. Refer to CPO Construction’s Salient Characteristics Guidelines for more information.

208-2.1 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 (1.12 Mg/cubic meter) 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 (4.75 mm) 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.

208-2.2 GRADATION. The gradation of the 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.

Include testing frequencies for the particle size distribution.

### Table 1 Requirements for Gradation of Aggregate

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sieve Designation** | | | **Percentage by weight passing sieves** | |
| 2” maximum | | 1 1/2” maximum | 1” maximum |
| 2 in (50.0 mm) | | 100 | -- | -- |
| 1-1/2 in (37.0 mm) | | 70-100 | 100 | -- |
| 1 in (25.0 mm) | | 55-85 | 70-100 | 100 |
| 3/4 in (13.0 mm) | | 50-80 | 55-85 | 70-100 |
| No. 4 (4.75 mm) | | 30-60 | 30-60 | 35-65 |
| No. 40 (0.45 mm) | | 10-30 | 10-30 | 10-25 |
| No. 200 (0.075 mm) | | 5-15 | 5-15 | 5-15 |

For frost areas, add requirements for the material finer than 0.02 mm to a maximum of 3% and the range for the 200 sieve to between 0 and 8%.

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 (0.075 mm) sieve shall not exceed one-half the fraction passing the No. 40 mesh (0.45 mm) sieve. The aggregate blend shall not contain more than 3% material finer than 0.02 mm.

The portion of the filler and binder, including any blended material, passing the No. 40 mesh (0.45 mm) 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. Tests for aggregates to check gradation shall be conducted by the Contractor at least two per lot. The lot will be consistent with acceptance sampling for density. The samples shall be taken from the in-place, compacted material. Sampling shall be in accordance with ASTM D 75, and testing shall be in accordance with ASTM C 136 and ASTM C 117.

208-2.3 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 (0.45 mm) 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 (4.75 mm) sieve and not more than 5% by weight shall pass a No. 200 mesh (0.075 mm) 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.

Note to Engineer. Delete subparagraph “b. Travel Plant”, if designer only wants to include a Plant Mix. References in subparagraph c & 208-3.4 a. to mixing in place should also be removed.

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 in (75 mm) nor more than 6 in (150 mm) 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 sq yd (1700 sq m) 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 [ ].

If nuclear density machines are to be used for density determination, the machines shall be calibrated in accordance with ASTM D 6938. The nuclear equipment shall be calibrated using blocks of materials with densities that extend through a range representative of the density of the proposed base material. When using the nuclear method, ASTM D 6938 shall be used to determine the moisture content of the material. (See Section 120 of the General Provisions for additional guidance)

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 sq yd (2000 sq m). A lot will consist of one-half day’s production where a day’s production is expected to consist of between 2400 and 4800 sq yd (2000 and 4000 sq m). All testing shall be done by a laboratory hired by the contractor. Testing results shall be furnished daily to the Engineer for acceptance determination.

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 [ ]. 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.

The Engineer shall specify ASTM D 698 for areas designated for aircraft with gross weights of 60,000 pounds (27 200 kg) or less and ASTM D 1557 for areas designated for aircraft with gross weights greater than 60,000 pounds (27 200 kg).

If nuclear density machines are to be used for density determination, the machines shall be calibrated in accordance with ASTM D 6938. The nuclear equipment shall be calibrated using blocks of materials with densities that extend through a range representative of the density of the proposed base material. When using the nuclear method, ASTM D 6938 shall be used to determine the moisture content of the material. (See Section 120 of the General Provisions for additional guidance)

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 in (9 mm) from a 16 ft (4.8 m) straightedge when applied to the surface parallel with, and at right angles to, the centerline. The grade shall be measured on a 50 foot grid and be within +0” /-1/2 inch.

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 sq yd (250 sq m). When the base deficiency is more than 1/2 in (12 mm), 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 The quantity of [crushed] aggregate base course to be paid for shall be the number of cubic yards (cubic meters) 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 sq yd (250 sq m) of base course, or by means of average end areas on the complete work computed from elevations to the nearest 0.01 ft (3 mm). On individual depth measurements, thicknesses more than 1/2 in (12 mm) in excess of that shown on the plans shall be considered as specified thickness plus 1/2 in (12 mm) in computing the yardage for payment. Base materials shall not be included in any other excavation quantities.

## BASIS OF PAYMENT

208-5.1 Payment shall be made at the contract unit price per cubic yard (cubic meter) for aggregate base course. 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.

Payment will be made under:

Item P-208-5.1 [Crushed] Aggregate Base Course-per cubic yard (cubic meter)

## TESTING REQUIREMENTS

|  |  |
| --- | --- |
| ASTM C 29 | Unit Weight of Aggregate |
| ASTM C 117 | Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing |
| ASTM C 131 | Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine |
| ASTM C 136 | Sieve Analysis of Fine and Coarse Aggregates |
| ASTM D 422 | Particle Size Analysis of Soils |
| ASTM D 698 | Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 kg) Rammer and 12 in (305 mm) Drop |
| ASTM D 1556 | Density of Soil in Place by the Sand-Cone Method |
| ASTM D 1557 | Test for Laboratory Compaction Characteristics of Soil Using Modified Effort |
| ASTM D 2167 | Density of Soil in Place by the Rubber-Balloon Method |
| ASTM D 3665 | Random Sampling of Paving Materials |
| ASTM D 4318 | Liquid Limit, Plastic Limit, and Plasticity Index of Soils |
| ASTM D 6938 | In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods |

End of Item P-208

## REFERENCES

1. ASTM compacted and tested
2. ASTM C 29 weight
3. ASTM C 29 Unit Weight of Aggregate
4. ASTM C 117 gradation
5. ASTM C 117 Materials Finer than 75um (No. 200) Sieve in Mineral Aggregates by Washing
6. ASTM C 131 coarse aggregate percent of wear
7. ASTM C 131 crushed coarse aggregate percent of wear
8. ASTM C 131 Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
9. ASTM C 136 gradation
10. ASTM C 136 Sieve or Screen Analysis of Fine and Coarse Aggregate
11. ASTM D 698 aircraft gross weights of 60,000 pounds or less
12. ASTM D 698 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49 kg) Rammer and 12 in (305 mm) Drop
13. ASTM D 1556 in-place field density
14. ASTM D 1556 Density of Soil in Place by the Sand-Cone Method
15. ASTM D 1557 aircraft gross weights greater than 60,000 pounds
16. ASTM D 1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. (4.5 kg) Rammer and 18 in (457 mm) Drop
17. ASTM D 2167 in-place field density
18. ASTM D 2167 Density of Soil in Place by the Rubber Balloon Method
19. ASTM D 2922 nuclear density machines
20. ASTM D 3017 moisture content
21. ASTM D 3665 random basis statistical procedures
22. ASTM D 3665 Random Sampling of Paving Materials
23. ASTM D 4318 liquid limit and plasticity index
24. ASTM D 4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils
25. FAA Item P-208 Aggregate Base Course

End of Item