FOR PROJECTS INITIATED
AFTER MARCH 1, 2012
REVISION 4

ITEM 230

CRUSHED AGGREGATE BASE COURSE

230.1 Description. This item shall consist of a foundation course for a surface course or for other base courses and shall be composed of crushed aggregate materials; and shall be constructed as herein specified in one or more courses in conformity with the typical sections shown on the plans and to the lines and grades as established by the Engineer.

230.2 Materials. The materials shall be obtained from approved sources, shall be crushed, and shall consist of durable particles of crushed aggregate, mixed with approved binding material. The crushed material shall have a minimum compressive strength of 45 psi at 0 psi lateral pressure and 175 psi at 15 psi lateral pressure using triaxial testing procedures. The crushed aggregate shall meet the following gradation when tested in accordance with ASTM C136.

Table I

Retained on Sieve Conforming to ASTM E11	Percent Retained, By Weight
l-3/4"	0
7/8"	10 - 35%
3/8"	30 - 50%
No. 4	45 - 65%
No. 40	70 - 85%

The material passing the No. 40 sieve shall meet the following requirements when tested in accordance with ASTM D4318.

The liquid limit shall not exceed 35
The plasticity index shall not exceed 10

All material retained on the No. 40 sieve shall have a Los Angeles Abrasion percent of wear not exceeding 40 when tested in accordance with ASTM C131.

With prior written permission of the Engineer, additives may be used to meet the above requirements.

230.3 Construction Methods. The subgrade shall be prepared in accordance with the pertinent Item for Subgrade. Immediately before placing the base material, the subgrade shall be checked as to conformity with the grade and section. Any deviation in excess of one-half (1/2) inch in cross-section and in a length of sixteen (16) feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and compacting by sprinkling and rolling. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of the work.

The material for the first course shall be deposited on the subgrade in a lift not to exceed six (6) inches in thickness. Material deposited upon the subgrade shall be spread and shaped the same day unless otherwise directed by the Engineer. The material shall be sprinkled, if directed and shall then be bladed, dragged and shaped to the typical sections as shown on the plans. All areas and most of segregated coarse or fine material shall be corrected or removed and replaced with well graded material as directed by the Engineer. If additional binder is considered desirable or necessary after the material is spread and shaped, it shall be furnished and applied in the amount directed by the Engineer. Such binder material shall be carefully and evenly incorporated with the material in-place by scarifying harrowing, brooming or by other approved methods.

The course shall be sprinkled as required and compacted to the extent necessary to provide not less than 95-percent of modified proctor density (ASTM D1557) at a moisture content ranging from optimum to +/- 3% (three-percent) above optimum. In addition to the requirements specified for density, the full depth of the flexible base shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section of flexible base is completed, tests as necessary will be made by the Engineer. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. Throughout this entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical sections shown on the plans and to the established lines and grades. In that area on which pavement is to be placed, any deviation in excess of 1/4-inch in cross section and in length of 16-feet measured longitudinally shall be corrected by loosening, adding or removing material as required, reshaping and recompacting by sprinkling and rolling. Should the base course, due to any reason or cause, lose the required stability, density or finish before the surface is complete, it shall be recompacted and refinished at the sole expense of the Contractor.

Construction methods for succeeding courses shall be the same as prescribed for the first course. Prior to placing the surfacing on the completed base, the base shall be dry cured to the extent directed by the Engineer.

230.4 Quality Assurance. The Materials Engineer will determine the Moisture-Density Relationship in accordance with ASTM D1557 on material secured from the source of supply, or the Contractor.

The Materials Engineer will determine the in-place density in accordance with ASTM D6938 or D1556. The minimum level of testing will consist of at least three tests for each 500 feet per lift per lane of roadway, or 4,000 square feet of completed base.

230.5 Acceptance Requirements. The completed base course will be checked for determining acceptance as provided herein.

Upon completion of compaction operations, the density of the completed course will be determined in accordance with ASTM D6938 or D1556. A minimum of one density test will be taken per 1,000 linear feet per roadway. The location of the test will be chosen randomly. If any density test is below requirements, two additional tests will be taken within 5-feet of the failing test location and the average of the three tests will be used as the value for the 1,000 foot location.

The density requirements as based on ASTM D1557, will be ninety-five percent of the maximum density.

If the density test value per 1,000 foot section is below ninety-five percent, a price adjustment will be supplied as follows:

Density Test Value	Percent of Contract Unit Price
95.0 and above	100
93.0 to 94.9	90
90.0 to 92.9	75
Below 90	50 or remove*

*At the option of the Engineer

The completed base course will not vary from plan thickness in excess of the following tolerances. Base course thickness deficiencies in excess of these tolerances shall be corrected, as specified herein, at the Contractor's expense.

Underthickness	Overthickness
1 inch	1-1/2 inches

If an individual test exceeds allowable tolerances, two additional tests will be taken within 5-feet of the failing test location and the average of the three tests (rounded off to the nearest 1/4-inch) will be used as the value

for that location. Any failing areas will be isolated for purposes of correction. Base course thickness deficiencies in excess of the foregoing tolerances shall be corrected as follows.

If no grade adjustments are permitted, thickness deficiencies shall be corrected by removing and replacing the full depth of base course in deficient areas with one of the following materials:

a. Cement Stabilized Crushed Aggregate Base Course, Item 231

b. Hot Mix Asphaltic Concrete Base Course, Item 250

If grade adjustments are permitted, the Contractor shall have the option of correcting thickness deficiencies by furnishing and placing a supplemental layer of asphaltic concrete conforming to Item 250, for the full width of the base course, in lieu of removing and replacing deficient base course. The thickness of the supplemental layer of asphaltic concrete shall be as follows:

BASE COURSE THICKNESS CORRECTION

Underthickness Inches	Overthickness Inches	Minimum thickness of Supplemental Asphaltic Concrete Inches
1/4 to 1-1/2	1-3/4 to 2	1
1-3/4 to 2	2-1/4 to 2-1/21-1/2	
2-1/4 to 2-1/2	2-3/4 to 3	2
Over 2-1/2	Over 3	Remove and replace

230.6 Measurement. Crushed Aggregate Base shall be measured by the square yard of material, furnished and compacted in place and to the thickness specified, or as shown on the plans.

230.7 Payment. Payment for Crushed Aggregate Base, complete and in-place, shall be at the contract unit price per square yard of the specified thickness, which unit price shall include all costs of materials furnished, hauled, dumped, spread, shaped and compacted in maximum 6-inch lifts, including water for sprinkling. If necessary, adjustments will be made in the payment for this item as outlined in Section 230.4 of this specification.

There are line code(s), description(s), and unit(s) for this item.

END OF ITEM 230