ITEM 247

FLEXIBLE BASE

247.1. Description. This Item shall govern for the delivery, stockpiling and/or the construction of foundation or base courses as herein specified and in conformity with the typical sections and to the lines and grades shown on the plans or established by the Engineer.

247.2. Materials. The flexible base material shall be crushed or uncrushed as necessary to meet the requirements herein, and shall consist of durable coarse aggregate particles and binding materials.

(1) General. When off-right-of-way sources are involved, the Con- tractor's attention is directed to Item 7, "Legal Relations and Responsibilities to the Public".

(2) Physical Requirements.

(a) General. All types shall meet the physical requirements for the specified grade(s) as set forth in Table 1.

Additives, such as, but not limited to, lime, cement or fly ash, shall not be used to alter the soil constants or strengths shown in Table 1, unless otherwise shown on the plans.

Unless otherwise shown on the plans, the base material shall have a minimum Bar Linear Shrinkage of 2 percent as determined by Test Method Tex-107-E, Part II.

The flexible base shall be one of the following types, as follows:

(b) Type A. Type A material shall be crushed stone produced from oversize quarried aggregate, sized by crushing and produced from a naturally occurring single source. Crushed gravel or uncrushed gravel shall not be acceptable for Type A material. No blending of sources and/or additive materials will be allowed in Type A material.

(c) Type B. Type B material shall be crushed or uncrushed gravel.

(d) Type C. Type C material shall be crushed gravel. Unless otherwise shown on the plans, crushed gravel shall have a minimum of 60 percent of the particles retained on the No. 4 sieve with two (2) or more crushed faces as determined by Test Method Tex-460-A, Part I.

(e) Type D. As shown on the plans.

TABLE 1
PHYSICAL REQUIREMENTS

GRADE 1	GRADE 2	GRADE 3
Triaxial Class 1: Min. compressive strength, psi: 45 at 0 psi lateral pressure and 175 at 15 psi lateral pressure Master Grading 1-3/4" 0	Triaxial Class 1 to 2.3: Min. compressive strength, psi: 35 at 0 psi lateral pressure and 175 at 15 psi lateral pressure Master Grading 2-1/2" 0	Triaxial Class - Unspecified Master Grading 2-1/2" 0

7/8" 10-35 3/8" 30-50 No. 4 45-65 No. 40 70-85 Max LL.....35 Max PI .....10 Wet Ball Mill Max .....40 Max increase in passing No. 40 20	1-3/4" 0-10 No. 4 45-75 No. 40 60-85 Max LL.....40 Max PI .....12 Wet Ball Mill Max .....45 Max increase in passing No. 40 20	1-3/4" 0-10 No. 4 30-75 No. 40 50-85 Max LL.....40 Max PI .....12 Wet Ball Mill Max .....50 Max increase in Passing No. 40 20

GRADE 4	GRADE 5	GRADE 6
Triaxial Class Unspecified Master Grading 1-3/4" .....0 No. 4 .....45-75 No. 40 .....50-85 Max LL.....40 Max PI 12	Triaxial Class Unspecified Master Grading 1-3/4" .....0 No. 40 .....50-85 Max LL.....40 Max PI 12	As Shown on the Plans

Notes:
1. Gradation requirements are percent retained on square sieves.
2. When a magnesium soundness value is shown on the plans the material will be tested in accordance with Test Method Tex-411-A.
3. When lightweight aggregates are used, the wet ball mill requirements will not apply and the lightweight aggregate shall meet the Los Angeles Abrasion, Pressure Slaking and Freeze Thaw requirements of Item 303, "Aggregate for Surface Treatment (Lightweight)".

(3) Pilot Grading. When pilot grading is required on the plans, the flexible base shall not vary from the designated pilot grading of each sieve size by more than five (5) percentage points. However, the flexible base grading shall be within the master grading limits as shown in Table 1. The pilot grading may be varied by the Engineer as necessary to insure that the base material produced will meet the physical requirements shown in Table 1.

(4) Testing. Testing of flexible base materials shall be in accordance with the following Department standard laboratory test procedures:

Moisture Content	Tex-103-E
Liquid Limit	Tex-104-E
Plasticity Index	Tex-106-E
Bar Linear Shrinkage	Tex-107-E, Part II
Sieve Analysis	Tex-110-E
Moisture-Density	

Determination	Tex-113-E
Roadway Density	Tex-115-E
Wet Ball Mill	Tex-116-E
Triaxial Tests (Part I or II as selected by the Engineer)	Tex-117-E
Particle Count	Tex-460-A, Part I

Samples for testing the base material for triaxial class, soil constants, gradation and wet ball mill will be taken prior to the compaction operations.

(5) Tolerances. Unless otherwise shown on the plans, the limits es- tablishing reasonably close conformity with the specified gradation and plasticity index are defined by the following:

(a) Gradation. The Engineer may accept the material, providing not more than one (1) out of the most recent five (5) consecutive gradation tests performed are outside the specified limits for master grading or pilot grading, as applicable, on any individual sieve by no more than five (5) percentage points.

(b) Plasticity Index. The Engineer may accept the material pro- viding not more than one (1) out of the most recent five (5) consecutive plasticity index samples tested are outside the specified limit by no more than two (2) percentage points.

(6) Material Sources. The flexible base material shall be furnished by the Contractor. When a non-commercial source is utilized, it shall be opened in such manner as to immediately expose the vertical faces of all the various strata of acceptable material. Unless otherwise approved by the Engineer, the material shall be secured and processed by successive vertical cuts extending through all of the exposed strata.

Unless otherwise shown on the plans, the flexible base material shall be temporarily stockpiled prior to delivery to the roadway. Unless other- wise shown on the plans, the stockpile shall not be less than 10 feet in height and shall be made up of layers not greater than two (2) feet in thickness. After a sufficient stockpile has been constructed the Contractor may proceed with loading from the stockpile for delivery. In loading from the stockpile for delivery, the material shall be loaded by making successive vertical cuts through the entire depth of the stockpile.

When temporary stockpiles are to be tested for acceptance prior to delivery to its intended use, any stockpile that has been sampled and accepted shall not have material added or removed unless otherwise approved by the Engineer. The Contractor will be charged for additional sampling and testing required as a result of material being removed from a previously approved stockpile without the approval of the Engineer. Such charges will be deducted from the Contractor's estimates.

Blending of materials from more than one (1) source to produce Type B, C or D flexible base will be allowed when approved by the Engineer.

247.3. Construction Methods.

(1) Complete In Place

(a) Preparation of Subgrade or Existing Roadbed. Prior to de- livery of the base material, the subgrade or existing roadbed shall be shaped to conform to the typical sections, shown on the plans or established by the Engineer. This work shall be done in accordance with the provision of the applicable bid items.

When shown on the plans and directed by the Engineer, the Contractor shall proof roll the roadbed in accordance with Item 216, "Rolling (Proof)". Soft spots shall be corrected as directed by the Engineer.

(b) First Course. It shall be the responsibility of the Contractor to deliver the required amount of base material to each 100 foot station. Base material shall be spread uniformly and shaped the same day as delivered. In the event inclement weather or other unforeseen circumstances render this impractical, the material shall be shaped as soon as practical.

Prior to compacting the flexible base, the flexible base material shall be bladed and shaped to conform to the typical sections as shown on the plans. All areas of segregated coarse or fine material shall be corrected or removed and replaced with well graded material, as directed by the Engineer and at the Contractor's expense.

The Contractor shall sprinkle for dust control as directed by the Engineer.

(c) Succeeding or Finish Courses. Construction methods shall be the same as required for the first course. Throughout this entire operation, the shape of each course shall be maintained by blading. Upon completion, the surface shall be smooth and in conformity with the typical section as shown on the plans and the established lines and grades. Prior to placing the surfacing on the completed base, the base shall be cured to the extent directed by the Engineer.

(d) Compaction Method. The flexible base shall be compacted by "Density Control" as shown on the plans. Water used for compaction shall conform to the material requirements of Item 204, "Sprinkling".

The flexible base shall be sprinkled as required and compacted to the extent necessary to provide not less than 100 percent density as determined by Test Method Tex-113-E, unless otherwise shown on the plans. After each section of flexible base is completed, tests as necessary will be made by the Engineer in accordance with Test Method Tex-115-E. When the material fails to meet the density requirements, or it loses the required stability, density or finish before the next course is placed or the project is completed, it shall be reworked and retested in accordance with Section 247.3.(1)(e).

(e) Reworking a Section. Should the base course, due to any reason or cause, lose the required stability, density or finish before the surfacing is complete, it shall be reworked, recompacted and refinished at the sole expense of the Contractor.

(f) Tolerances. Tolerances shall conform to the following:

(i) Density Tolerances. The Engineer may accept the work pro- viding not more than one (1) out of the most recent five (5) consecutive density tests performed is below the specified density, and providing that the failing test is no more than three (3.0) pounds per cubic foot below the specified density.

(ii) Grade Tolerances. In areas on which surfacing is to be placed, any deviation in excess of 1/4 inch in cross section or 1/4 inch in a length of 16 feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling.

(g) Thickness Measurement. When the measurement is by the square yard, the flexible base will be measured for depth in units of 4000 square yards, or fraction thereof. The measurements will be at location(s) determined by the Engineer and performed in accordance with Test Method Tex-140-E. In any unit where flexible base is deficient by more than 1/2 inch in thickness, the deficiency shall be corrected by scarifying, adding material as required, reshaping, recompacting and refinishing at the Contractor's expense.

(2) Roadway Delivery. It shall be the responsibility of the Contractor to deliver the required amount of base material to each 100 foot station. All processing or manipulations will be in accordance with the applicable bid items.

(3) Stockpile Delivery. It shall be the responsibility of the Contractor to prepare the stockpile site, to provide and deliver the required amount of base material to the designated stockpile site and to construct the stockpile. Unless otherwise shown on the plans, the stockpile shall not be less than ten (10) feet in height and shall be made up of layers not to exceed two (2) feet in thickness.

247.4. Measurement. This Item will be measured by either Mea- surement Class 1, 2, 3, 4, or 5 as shown on the plans:

(1) Measurement Class 1. Measurement will be by the cubic yard in vehicles of uniform capacity.

(2) Measurement Class 2. Measurement will be by the ton of 2000 pounds dry weight in vehicles as delivered. A set of standard platform truck scales conforming to the requirements of Item 520, "Weighing and Measuring Equipment", shall be furnished by the Contractor and placed at a location approved by the Engineer. When the material is weighed during mixing or batching, reweighing will not be necessary. The dry weight will be determined by deducting the weight of the moisture in the material at the time of weighing from the gross weight of the material. The moisture in the material will be determined in accordance with Test Method Tex-103-E at least once each day and more often if conditions warrant.

(3) Measurement Class 3. Measurement will be by the cubic yard in the final stockpile position. The volume of flexible base will be computed in place between the natural ground and the top of the stockpile by the method of average end areas.

(4) Measurement Class 4. Measurement will be by the cubic yard in the completed and accepted final position. The volume of base course will be computed in place between the original subgrade or subbase surfaces, and the lines, grades and slopes of the accepted base course as shown on the plans by the method of average end areas.

Measurement Class 4 is plan quantity measurement Item and the quantity to be paid for will be that quantity shown in the proposal and on the "Estimate and Quantity" sheet of the contract plans, except as may be modified by Article 9.8. If no adjustment is required, additional measurements or calculations will not be required. No payment will be made for thickness or width exceeding that shown on the typical section or provided on the plans.

(5) Measurement Class 5. Measurement will be by the square yard of surface area in the completed and accepted position. The surface area of the base course will be based on the width of flexible base as shown on the plans.

Measurement Class 5 is a plans quantity measurement Item and the quantity to be paid for will be that quantity shown in the proposal and on the "Estimate and Quantity" sheet of the contract plans, except as may be modified by Article 9.8. If no adjustment is required, additional mea- surements or calculations will not be required. No payment will be made for thickness or width exceeding that shown on the typical section or provided on the plans.

247.5. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Flexible Base (Complete in Place)" of the type, grade and measurement class specified; for "Flexible Base (Roadway Delivery)" of the type, grade and measurement class specified; and for "Flexible Base (Stockpile Delivery)" of the type, grade and measurement class specified. This price shall be full compensation for securing and furnishing all materials, including royalty and freight involved; for furnishing scales and labor involved in weighing the material when required; for loosening, blasting, excavating, screening, crushing and temporary stockpiling when required; for loading all materials; for all hauling and delivering and for all manipulations; sprinkling; for rolling, except for proof rolling; sprinkling for dust control, for labor, tools and incidentals necessary to complete the work except as follows:

When the plans specify "Flexible Base (Complete in Place)", the unit price bid shall be full compensation for shaping and fine grading the roadbed; and for spreading, mixing, blading, compacting, shaping, finishing, and curing the base material.

When the plans specify "Flexible Base (Roadway Delivery)", the unit price bid will not include processing at the roadway. Measurement will be only by Measurement Class 1 or 2.

When the plans specify "Flexible Base (Stockpile Delivery)", the unit price bid also will be full compensation for preparing the stockpile area and for spreading and shaping the material in the stockpile. Measurement will be only by Measurement Class 1, 2, or 3.

When proof rolling is shown on the plans, and when directed by the Engineer, it will be paid for in accordance with Item 216, "Rolling (Proof)".

When subgrade is constructed under this project, correction of soft spots will be at the Contractor's expense. When subgrade is not constructed under this project, correction of soft spots in the subgrade or existing roadbed will be in accordance with Article 4.3.