ITEM NO. 200
Flexible Base

200.1 DESCRIPTION: This item shall govern a foundation course for surfacing, pavement, or other base courses in conformity with the typical sections shown in the contract documents and to the lines and grades as established by the Engineer.

200.2 REFERENCE STANDARDS: Reference standards cited in this Specification Item No. 200 refer to the current reference standard published at the time of the latest revision date logged at the end of this Specification Item No. 200, unless a date is specifically cited**.**

1. San Antonio Water System (SAWS):
   a. Specifications for Water and Sanitary Sewer Construction
   b. SAWS Materials Specifications
2. City of San Antonio (COSA) Specifications for Construction
3. American Society for Testing and Materials (ASTM) International:
   a. ASTM C 131/C131M – Standard Test Method for Resistance to Degradation of Small-Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine
   b. ASTM D 1556 - Density of Soil in Place by the Sand-Cone Method.
   c. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12.44 ft-lbf/ft3).
   d. ASTM D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   e. ASTM D 361 - Test Method for Water Content of Soils and Rock in Place by Nuclear Methods (shallow depth).
   f. ASTM D 3017 - Test Method for Water Content of Soils and Rock in Place by Nuclear Methods.
   g. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
4. Texas Department of Transportation
   a. TxDOT Tex-101-E - Preparation of Soil and Flexible Base Materials for Testing.
   b. TxDOT Tex-103-E – Determining Moisture Content in Soil Materials
   c. TxDOT Tex-104-E – Determining Liquid Limits of Soils
   d. TxDOT Tex-105-E – Determining Plastic Limit of Soils
   e. TxDOT Tex-106-E – Determining Plasticity Index of Soils
   f. TxDOT Tex-107-E Determining the Bar Linear Shrinkage of Soils
   g. TxDOT Tex-108 -E Determining the Specific Gravity of Soils
   h. TxDOT Tex-110-E - Determination of Particle Size Analysis of Soils.
   i. TxDOT Tex-113-E – Laboratory Compaction Characteristics and Moisture-Density Relationships of Base Materials
   j. TxDOT Tex-114-E – Laboratory Compaction Characteristics and Moisture –Density Relationship of Subgrade, Embankment Soils, and Backfill Material

200.3 SUBMITTALS: Contractor shall submit manufacturer's product data, instructions recommendations, shop drawings, and certifications. All submittals shall be in accordance with Owner's requirements and submittals shall be approved prior to delivery**.**

200.4 MATERIAL: The material shall be crushed as necessary to meet the requirements hereinafter specified, and shall consist of durable stone crushed and/or screened to the required particle size, with or without other approved fine- sized material. The material shall be from approved sources.

200.5 TESTING:

1. Testing of flexible base materials shall be in accordance with the following TXDOT standard laboratory test procedures:

Preparation for Soil Constants and Sieve Analysis	Tex-101-E
Liquid Limit	Tex-104-E
Plastic Limit	Tex-105-E
Plasticity Index	Tex-106-E
Linear Shrinkage	Tex-107-E
Sieve Analysis	Tex-110-E
Los Angeles Abrasion	ASTM C131 (Grade A)

2. Samples for testing the material shall be made available to the Inspector and taken prior to the compaction operations.
3. The material shall be well graded and, when properly tested, meet the following requirements:

Retained on 1- ¾ inch sieve	0 %
Retained on No. 4 sieve	45 to 75 %
Retained on No. 40 sieve	60 to 85 %

4. The material passing the No. 40 sieve shall be known as Soil Binder and shall meet the following requirements:

Liquid Limit shall not exceed	40
Plasticity Index shall not exceed	12

5. The crushed stone shall have an abrasion of not more than 40, when subjected to the Los Angeles Abrasion Test.

200.6 CONSTRUCTION METHODS: The flexible base material shall be placed on the approved subgrade, in courses not to exceed 6 inches compacted depth.

1. It shall be the responsibility of the Contractor that the required amount of material be delivered and uniformly spread and shaped.
2. All material shall be removed from the place where it is dumped by cutting into windrows.
3. It shall be sprinkled, spread, shaped, and rolled in proper sequence to prevent segregation and as necessary for required compaction.
4. Upon completion, the surface shall be smooth and in conformity with typical sections and to the established lines and grades.
5. Any deviation in excess of ¼ inch in cross section and in length of 16 feet measured longitudinally shall be corrected.
6. All irregularities, depressions, or weak spots which develop shall be corrected at no expense to SAWS.
7. Flexible base shall be compacted to an relative dry density of not less than 95% of the maximum dry density as determined in accordance with TXDOT Test Method Tex 113-E.

8. All density tests will be made within 24 hours after compaction operations are completed.
9. Just prior to the placing of any succeeding course of flexible base or surfacing on a previously completed course, the density and moisture of the top 3 inches of flexible base shall be checked and if the test shows the density to be more than 2% below the specified minimum or the moisture content to be more than 3% above or below the optimum, the course shall be reworked as necessary to obtain the specified compaction and moisture content.
10. The Contractor shall be responsible for compaction in accordance with the appropriate Specification.
    a. Compaction tests will be done at one location point randomly selected or as indicated by the SAWS Inspector/Test Administrator.
    b. The inspector shall determine the depth at which the density test shall be taken.
    c. All depths shall be considered for testing without a predetermined maximum or minimum
    d. Test requirements above are indicated as a minimum requirement, but maybe subjected to follow more stringent requirements as established by other appropriate agencies (such as COSA Public Works Right of Way Management Plan, etc.)
    e. Any failed test shall require the Contractor to remove and replace that layer of material to a length 50 feet in both directions from the failed test location.
        1) The Contractor will also be required at no cost to SAWS to provide two additional tests at the replaced location where the initial test failed and at one location point, randomly selected or as indicated by the SAWS Inspector/Test Administrator.
    f. The Contractor shall be responsible for all costs associated with the proctor and density tests, and for providing to SAWS and Consultant, if applicable, verification that necessary compaction levels were achieved.
11. These tests shall be performed by a nationally-accredited, independent testing laboratory.
12. If the material fails to meet the density specified, it shall be reworked as necessary to meet the required density.

200.7 MEASUREMENT: Flexible Base will be measured by the square yard, complete in place, for the thickness specified in the contract documents, or by the cubic yard, complete in place as indicated in the contract documents.

200.8 PAYMENT: This item will be paid for at the contract unit price bid for "Flexible Base" which price shall be full compensation for all work herein specified, including the furnishing, hauling, and placing of all materials, for all water required, and for all equipment, tools, labor, and incidentals necessary to complete the work.

End of Specification