SECTION 321100

CRUSHED BASE COURSE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This work is the placing of one or more base courses composed of crushed gravel, stone or other similar materials meeting the gradation or maximum size specified herein. (GOVERNMENT FURNISHED – Only Placement requirements Apply)

1.02 REFERENCES

AASHTO T11	Amount Finer than No. 200 (0.075 mm) Sieve in Aggregate
AASHTO T27	Sieve Analysis of Fine and Coarse Aggregates
AASHTO T89	Determining Liquid Limit of Soils
AASHTO T90	Determining the Plastic Limit and Plasticity Index of Soils
AASHTO T176	Sand Equivalent Value of Soils and Fine Aggregate
AASHTO T96	Resistance to Degradation by Abrasion and Impact in the Los Angeles Machine
AASHTO T99	Moisture-density Relations of Soils and Soil-Aggregate Mixtures
(ASTM D698)	Using 5-lb (2.5 kg) Rammer and 12-Inch (305 mm) Drop
ASTM D5821	Determining the Percentage of Fractured Particles in Coarse Aggregate
AASHTO T191	Density of Soil In-Place by Sand Cone Method
(ASTM D1556)	
AASHTO T238	Density of Soil and Soil-Aggregate In-Place By Nuclear Method
(ASTM D2922)	(Shallow Depth)
AASHTO T239	Moisture Content of Soil-Aggregate In-Place By Nuclear Method
(ASTM D3017)	(Shallow Depth)

1.03 DENSITY CONTROL TESTING

A. Field Density Testing

1. Meet the quality control and quality assurance testing requirements of Division 1.
2. In-place field density tests for quality assurance are at Contractor's expense meeting ASTM D1556 Sand Cone method or AASHTO T310 (ASTM D6938) Nuclear Densometer method. Quality assurance field density testing frequency is 1 test per 500 square feet per lift.

   The Contractor shall submit test results performed by an independent testing laboratory on all crushed aggregate before material is brought on site. Failure of any or all tests shall be cause for rejection of the materials. A minimum of one test for gradation, plasticity indexes, liquid limit and fracture shall be provided for conformance. Submit test results at least 48 hours before material is brought to site.
3. Retesting of failing areas is at the expense of the Contractor.

B. Laboratory Maximum Density and Optimum Moisture

1. Moisture density curves will be provided by the Contractor for each base material provided. These will be provided at the expense of the Contractor.

1.04 MATERIALS SUBMITTALS

A. Submit to the Contracting Officer gradations, moisture density curves and other test results for sources to be used for base materials prior to delivery to the site for approval by the Contracting Officer.

PART 2 - PRODUCTS

2.01 GENERAL

A. Furnish aggregate base material meeting the applicable aggregate quality requirements.

2.02 CRUSHED BASE MATERIAL

A. Consists of both fine and coarse fragments of crushed stone or crushed gravel, and/or natural gravel, and when approved, blended with sand, finely crushed stone, crusher screenings or other similar materials.

B. Use crushed stone or gravel consisting of hard, durable particles of fragments of stone, free in excess of flat, elongated, soft or disintegrated pieces, dirt, or other deleterious matter, and having a percent of wear not exceeding 50 at 500 revolutions when tested under AASHTO T96

C. Crush material so that the percentage of fractured particles in the finished product is as constant and uniform as practical. Crush to produce material where at least 50 percent of the material retained on the No. 4 sieve has at least one fractured face.

D. Incorporate all material produced in the crushing operation and passing the No. 4 mesh sieve into the base material necessary to meet the gradation requirements.

E. Scoria base course will not be acceptable.

2.03 BASE COURSE GRADATION

A. As determined by AASHTO Methods T11 and T27, furnish material for the grading specified in the contract documents including binder or filler, which may have been added at the plant or at the site, meeting the requirements of that grading in the Table of Gradations below:

For this project, gravel surfacing and crushed base course for placement beneath new sidewalks, concrete slabs and asphalt surfacing shall be 3/4” minus material meeting the gradation shown in the Table of Gradations below:

TABLE OF GRADATIONS

PERCENTAGES BY WEIGHT PASSING SQUARE MESH SIEVE

Passing	¾” Minus
3/4 Inch	100
No. 4 Sieve	40-70
No. 10 Sieve	25-55
No. 200 Sieve	2-10

B. Up to 5% “oversized” material is permitted provided that the "oversized" material passes the screen size immediately larger than the top size specified. The produced material between the maximum screen opening and the No. 4 sieve shall be reasonable well graded.

C. Suitability of the aggregate is based on samples obtained during placement in the project within the limits allowed in the table for the particular grading specified.

D. That portion of the fine aggregate passing the No. 200 sieve must be less than 60 percent of that portion passing the No. 40 sieve.

E. The liquid limit for that portion of the fine aggregate passing a No. 40 sieve cannot exceed 25, nor the plasticity index exceed 6, as determined by AASHTO T89 and T90.

2.04 WATERING

A. Use uncontaminated water.

PART 3 - EXECUTION

3.01 GENERAL

A. Before placing the base course, smooth and shape the surface of the underlying subgrade, sub-base or base course to the cross section shown on the plans before placing the base course.

B. Do not place base course on a wet or muddy subgrade or sub-base course. Complete at least one area of finished and accepted subgrade, sub-base or underlying base before the placing of any base course.

3.02 PLACEMENT AND SPREADING

A. Mix and place the material in maximum 8 inches (20 centimeters) compacted layers unless otherwise approved. Deposit and spread each load of material on the prepared subgrade, or on a completed sub-base or base course layer continuously without interruption. Discontinue operating haul units over subgrade, or over any sub-base or base course completed if the haul units damage the subgrade, sub-base or base course.

B. Deposit and spread the material in a uniform layer, without segregation, to a loose depth that when compacted, and making allowance for any filler to be blended on the road/parking lot, the layer has the specified thickness.

C. Spread material using dump boards, spreader boxes, or vehicles equipped to distribute the material in a uniform layer. The material may be deposited in windrows mixed and spread as described below.

D. Construct each layer meeting these requirements. Blade smooth and thoroughly compact each layer as specified before placing the succeeding layer.

E. If segregation or moisture problems exist, or if the material was placed on the road/parking lot in windrows, thoroughly blade-mixed the material of the affected layer by alternately blading to the center and back to the edges of the road/parking lot.

F. Uniformly add water, when required, on site and place in amounts required to compact the material as necessary to aid in densification and to limit segregation. Maintain an adequate water supply during the work. Assure the equipment used for watering is of the capacity and design to provide uniform water application.

G. Apply water during the work to control dust and to maintain the base course in a damp condition.

3.03 FIELD DENSITY REQUIREMENTS

A. Compact placed material the full width by rolling with suitable tamping equipment or power rollers. Correct all irregularities or depressions that develop during rolling by loosening the material in these places and adding or removing material, as required.

B. Perform blading and compacting alternately as required or directed, to maintain a smooth, even, uniformly compacted surface until the final inspection. Along curbs, headers, manholes, and similar structures, and at all places not accessible to the roller, compact the base course material with suitable mechanical tampers or hand tampers to reach the compaction requirements.

C. Provide the watering and rolling required to obtain a minimum field density of 95 percent of maximum dry density as determined by AASHTO T99. No separate compensation is made for rolling and watering the base course.

3.04 SURFACE TOLERANCES

A. The base course surface when finished and tested with a 10-foot (3.0 meter) straight edge placed on the surface with its center line parallel to the center line of the street, shall not have a surface deviation from the straight edge exceeding 3/8-inch (1.0 centimeter). Additionally, the finished grade cannot deviate more than 0.05 feet (1.5 centimeters) at any point from the staked elevation, and further, the sum of the deviations from two points not more than 30 feet (9.0 meters) apart cannot exceed 0.05 feet (1.5 centimeters)

B. For base course receiving asphalt concrete surfacing, the finished grade cannot deviate more than 0.02 feet (0.6 centimeters) at any point from the staked elevations and the sum of the deviations from two points not more than 30 feet (9.0 meters) apart cannot exceed 0.02 feet (0.6 centimeters).

C. If patching of the base course is necessary to meet the tolerances, perform patching using methods and aggregates approved by the Contracting Officer.

END OF SECTION