SECTION 02516

SPECIFICATIONS FOR SOIL-CEMENT BASE COURSE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Preparation of sub-grade

B. Pulverization of soil material

C. Application, mixing and spreading of soil-cement mix

D. Compaction, finishing and curing of soil-cement

1.02 RELATED WORK

A. Section 02210: Grading and Excavation

B. Section 02215: Base and Sub-Grade Treatment

C. Section 02221: Trenching, Backfilling and Compaction

D. Section 02513: Asphaltic Concrete Paving

PART 2 PRODUCTS

2.01 PORTLAND CEMENT – Portland cement shall comply with the latest specifications for Portland cement (ASTM C150, CSA Standard A5 or AASHTO M85) or blended hydraulic cements (ASTM C595 or AASHTO M240, excluding slag cements Types S and SA) for the type specified.

2.02 WATER – Water shall be free from substances deleterious to the hardening of the soil cement.

2.03 SOIL MATERIAL – Soil material shall consist of the material existing in the area to be paved, of approved borrow material or of a combination of these materials proportioned as directed. The soil shall not contain gravel or stone retained on a 2-in. sieve.

PART 3 EXECUTION

3.01 PREPARATION

A. Before other construction operations are begun, the area to be paved shall be graded and shaped as required to construct the soil-cement in conformance with grades, lines, thicknesses and typical cross section shown on the plans. Unsuitable soil material shall be removed and replaced with acceptable material.

B. The sub-grade shall be firm and able to support without displacement the construction equipment and the compaction hereinafter specified. Soft or yielding sub-grade shall be made stable before construction proceeds.

3.02 PULVERIZATION

A. Before cement is applied, the soil material shall be so pulverized that at the completion of moist-mixing, 100% by dry weight passes a 1-in. sieve, and a minimum of 80% passes a no. 4 sieve, exclusive of gravel or stone retained on these sieves.

3.03 CEMENT APPLICATION, MIXING AND SPREADING

A. Mixing of the soil material, cement and water shall be accomplished either by the mixed-in place or the central-plant-mixed method.

B. No cement or soil-cement mixture shall be spread when the soil or sub-grade is frozen or when the air temperature is less than 40°F in the shade.

C. The percentage of moisture in the soil material, at the time of cement application, shall be the amount that assures a uniform and intimate mixture of soil material and cement during mixing operations. It shall not exceed the specified optimum moisture content for the soil-cement mixture.

D. The operations of cement application, water application, mixing, hauling, spreading, compacting, and finishing shall be continuous and completed in daylight. The total elapsed time between the addition of water to the soil-cement mixture and the completion of finishing shall not exceed 4 hours.

E. Ally soil and cement mixture that has not been compacted and finished shall not remain undisturbed for more than 30 minutes.

3.03 CENTRAL-PLANT-MIXED METHOD

A. The soil material, cement and water shall be mixed at an approved central mixing plant by either continuous-flow or batch-type mixers using revolving blades or rotary-drum mixers.

B. The plant shall be equipped with feeding and metering devices that will add the soil material, cement and water into the mixer in the specified quantities. Soil material and cement shall be mixed sufficiently to prevent cement balls from forming when water is added.

C. The mixing time shall be that which is required to secure an intimate, uniform mixture of soil material, cement and water.

D. Free access to the plant shall be provided to the Town engineer or his duly authorized representative at all times for inspection of the plant's operation and for sampling of the soil-cement mixture and its components.

E. The mixture shall be hauled to the paving area in trucks or other equipment having clean beds. The contractor shall protect the soil-cement mixture and its components.

F. Haul time should not exceed 30 minutes.

G. The mixture shall be placed on a moist sub-grade without segregation at a quantity per linear foot that will produce uniformity compacted base conforming to the required grade and cross-section. Either one or several approved spreaders shall spread the mixture. Not more than 30 minutes shall elapse between placement of soil-cement in adjacent lanes at any location except at longitudinal and transverse construction joints.

H. Compaction shall start as soon as possible after spreading and the elapsed time between the addition of water to the soil-cement mixture and the start of compaction shall not exceed 60 minutes.

3.05 MIXED-IN-PLACE METHOD

A. Soil material to be mixed with cement and water in a traveling pug mill mixer shall be formed into windrows of the required size with a sizing device. The tops of windrowed soil material shall be flattened or slightly trenched to receive the cement. Cement shall be spread uniformly on top of the windrowed material.

B. The cement to be mixed with soil material using a single or multiple transverse shift mixers shall be spread uniformly in a specified quantity on the area to be paved. Spread cement that has been displaced shall be replaced before mixing is started. The accuracy of cement spread shall be measured in one of two methods:

1. Spot-check. Place a canvas, usually 1 sq. yd. ($1m^2$) in area, on the roadway ahead of the cement spreader. After the spreader has passed, carefully pick-up the canvas and weigh the cement collected on it.
2. Overall check. Check the distance of area over which a truckload of cement of known weight is spread.

C. After the cement is spread, it shall be mixed with the soil material and water with a traveling pug mill, single or multiple transverse shaft mixers.

D. The water may be applied through the mixing machine or separately by approved pressure-distributing equipment. The soil material and cement shall be mixed sufficiently to prevent cement balls from forming when water is added. Mixing shall be continued until the mixture is uniform in color and at the required moisture content throughout. Operations of cement spreading, water application, mixing and spreading mixed material from a windrow, if required, shall result in a uniform soil, cement and water mixture for the full depth and width.

3.06 COMPACTION

A. At the start of compaction, the percentage of moisture in the mixture and in un-pulverized soil lumps shall not be below or more than two percentage points above the

specified optimum moisture content, and shall be less than that quantity which will cause the soil-cement mixture to become unstable during compaction and finishing. The specified optimum moisture content and density shall be determined in the field by a moisture-density test, AASHTO T134 or ASTM D558, on representative samples of soil-cement mixture obtained from the area being processed at the time compaction begins.

B. Before compaction, the mixture shall be in a loose condition for its full depth. The loose mixture shall then be compacted uniformly to the specified density. During compaction operations, initial shaping may be required to obtain compaction and required grade and cross section.

3.07 FINISHING

A. When initial compaction is nearing completion, the surface of the soil-cement shall be shaped to the required lines, grades and cross section. The moisture content of the surface material shall be maintained at not less than its specified optimum moisture content during finishing operations.

B. If necessary, the surface shall be lightly scarified to remove any tire imprints or smooth surfaces left by equipment. Compaction shall then be continued until uniform and adequate density is obtained. Rolling shall be supplemented by broom dragging, if required.

C. The soil-cement shall be uniformly compacted to a minimum of 96% of maximum density.

D. Compaction and finishing shall be done in such a manner as to produce, in not longer than 2 hours, a smooth, dense surface free of compaction planes, cracks, ridges or loose material.

3.08 CURING

A. After the soil-cement has been finished as specified herein; it shall be protected against drying for 7 days by the application of bituminous materials. The finished soil-cement shall be kept continuously moist until the bituminous curing material is placed. The curing material shall be applied as soon as possible and not later than 24 hours after completing finishing operations.

B. At the time the bituminous material is applied, the soil-cement surface shall be dense, shall be free of all loose and extraneous material and shall contain sufficient moisture to prevent excessive penetration of the bituminous material.

C. The bituminous material specified shall be uniformly applied to the surface of the completed soil-cement at the rate of approximately 0.2 gal per square yard with approved heating and distributing equipment. The engineer will specify the exact rate and temperature of application for complete coverage without undue runoff.

D. Should it be necessary for construction equipment or other traffic to use the bituminous-covered surface before the bituminous material has dried sufficiently to prevent pick-up, sufficient granular cover shall be applied before such use.

E. The contractor shall maintain the curing material during the 7-day protection period so that all of the soil-cement will be covered effectively during the period.

F. The Town Engineer may authorize other methods of curing.

G. Finished portions of soil-cement that are traveled on by equipment used in constructing ad adjoining section shall be protected in such a manner as to prevent equipment from marring or damaging completed work.

H. Sufficient protection from freezing shall be given the soil-cement for 7 days after its construction and until it has hardened.

3.09 CONSTRUCTION JOINTS

A. At the end of each day's construction cutting back into the completed work to form a true vertical face shall form a straight transverse construction joint.

B. Soil-cement for large, wide areas shall be built in a series of parallel lanes of convenient length and width meeting approval of the Town engineer. Straight longitudinal joints shall be formed at edge of each day's construction by cutting back into completed work to form a true vertical face free of loose or shattered material.

C. Special attention shall be given to joint construction to ensure a vertical joint adequately mixed material and compaction up against the joint. On mixed-in-place construction using transverse shaft mixers, a longitudinal joint constructed adjacent to partially hardened soil-cement built the preceding day may be formed by cutting back into the previously constructed area during mixing operations. Guide stakes shall be set for cement spreading and mixing.

3.10 TRAFFIC

A. Completed portions of soil-cement may be opened immediately to local traffic and to construction equipment provided the curing material is not impaired. The section may be opened to all traffic after the 7-day curing period, provided the soil-cement has hardened sufficiently to prevent marring or distorting of the surface by equipment or traffic.

3.11 MAINTENANCE

A. The contractor shall be required to maintain the soil-cement in good condition until all work has been completed and accepted or until the base (binder) course of asphalt has been placed on the soil cement base. Maintenance shall include immediate repairs of any defects that may occur. This work shall be done by the contractor at his own expense and repeated as often as may be necessary to keep the area continuously intact.

B. Faulty work shall be replaced to the full depth of treatment rather than by adding a thin layer of soil-cement to the completed work.

3.12 TESTING

A. Contractor shall provide approved testing lab to provide mix design, and conduct on-site testing during construction operations to test for optimum moisture, volume of cement, density and any other testing required for a complete project as specified.

B. Minimum compression strength at 7 days for secondary streets shall be 350 PSI and shall be 500 PSI for collector and larger streets. Copies of all testing reports shall be submitted to Town of Collierville for engineering review and approval.

C. Soil-cement will be proof rolled with equipment weighing no less than 50,000 lbs. gross weight after 7-day curing period. Any failure will be repaired and re-checked until acceptable.

END OF SECTION