

## **SECTION 02621**

### **AGGREGATE BASE AND SUBBASE COURSES**

#### **02621.01 GENERAL**

##### **A. Description**

Aggregate base and subbase courses shall include, but not necessarily be limited to, furnishing and placing one or more courses of aggregate, including additives when required, on a surface prepared in accordance with the Contract Documents.

##### **B. Related Work Included Elsewhere**

1. Construction Stakeout; Section 01300.
2. Subgrade preparation; Section 02610.
3. Chemically treated subgrade; Section 02611.

##### **C. Quality Assurance**

1. Materials

All aggregate base and subbase materials will be subject to test by the Contractor to determine the material's compliance with these Specifications. The Contractor shall retain a Geotechnical Engineer, a Professional Engineer, registered in the State of Maryland. When specific materials tests are called for in the referenced standards and specifications, the County Engineer will have the option of requiring that any or all of these tests be performed for materials furnished for a specific project. When testing is required, it will be specified herein or in the "Special Provisions."

2. Soil Tests

- a. Soil Laboratory and Field Density Tests

- 1) The Contractor will arrange for all in-place moisture/density testing on the Project. The Geotechnical Engineer, with the concurrence of the County Engineer, shall determine the number of samples to be taken and the frequency of tests required to confirm compliance with the Specifications. The Contractor shall assist the Geotechnical Engineer in obtaining samples and shall provide a smooth surface for conducting field/density tests. The Contractor will not be entitled to any claim for additional compensation due to the testing requirements specified herein.

- 2) The method for testing materials shall be in accordance with the requirements of AASHTO T 180, Method C or D as directed by the Geotechnical, with the concurrence of the County Engineer, or as specified herein.
- 3) At the start of aggregate base and subbase construction, the Contractor shall demonstrate to the Geotechnical or County Engineer that the compaction density specified in Section 02260.03 can be attained by the compaction equipment and methods the Contractor intends to use. Once the method and equipment have been approved, no substitutions will be permitted without written approval from the Geotechnical, with the concurrence of the County Engineer.
- 4) Should testing determine that the required density is not being met, or the material is outside the specified moisture range, the Contractor shall, without additional compensation re-excavate, rework, and/or recompact the particular layer or section until the required density and moisture are attained.

b. Thickness Tolerances

- 1) The thickness shall be determined by the Geotechnical, with the concurrence of the County Engineer, at 500 foot intervals per lane per course by means of test holes dug by the Contractor.
- 2) When the base course consists of two or more superimposed courses, the total thickness of the composite base courses shall be determined as denoted above.
- 3) Test holes shall have a minimum diameter of twice the thickness of the layer being placed but shall not exceed 10 inches in diameter. The Contractor shall refill all test holes and corings and compact the material to the required density.
- 4) In addition to each layer being required to meet a specified depth, the total depth of the completed base or subbase shall equal the summation of the specified thicknesses of all layers. Any deficiency in total compacted depth shall be corrected by loosening the surface, adding material, and finishing in accordance with these Specifications.
- 5) The completed base or subbase course shall be true to the lines, grades, and cross sections specified. A string line and grade stakes shall be set in accordance with Section 01300.03.C.3. Deviations in excess of ½ inch from the cross section and profile grade shown on the Plans shall be corrected. Corrections shall also be made whenever the surface deviates more than ½ inch from a 10-foot straightedge applied longitudinally to the finished surface.
- 6) Portions of the base or subbase course which do not meet the above requirements shall be corrected by being removed and

reconstructed, rerolled, or having the surface reworked as described under Section 02621.03. These corrective measures shall be performed by the Contractor without additional compensation.

3. Laboratory Tests

Laboratory grading tests for graded aggregate for base courses shall be performed in accordance with AASHTO T 27 except that the portion larger than the No. 4 sieve will be tested omitting AASHTO T11. Field gradation will be determined in accordance with AASHTO T 27 omitting AASHTO T11.

The percentage of wear shall not exceed 50% when tested in accordance with AASHTO T 96. The soundness loss by five cycles of the sodium sulfate test shall not exceed 12% when tested in accordance with AASHTO T104. Field gradations will be permitted to go outside of the master band requirements provided that the grading is within the specified tolerances from the approved gradation.

**D. Submittals**

1. Material Tests

Material test results shall be submitted for all aggregate furnished from other than a licensed commercial operating supplier. The tests shall demonstrate that the material meets all the requirements specified herein.

2. Certificates of Compliance

Certificates of compliance shall be submitted in accordance with the "General Provisions" for the following materials. The certificate shall state that the material meets the requirements specified herein.

- a. Aggregates furnished by a licensed commercial operating supplier,
- b. All plant mixed materials,
- c. Chemicals or additives when used.

**02621.02 MATERIALS**

**A. Materials Furnished by the County**

1. The County will not furnish any materials for aggregate base and subbase courses.
2. The Contractor may obtain water from the County's potable water system, for application to the base or subbase courses, in accordance with current County policies and procedures. The Contractor shall contact the Department of Fiscal Services, Meter Section, for requirements. A backflow prevention device must be placed in accordance with the Standard Details prior to drawing County water.

**B. Contractor's Options**

Calcium chloride may be furnished in either solid or solution form.

C. Detailed Material Requirements

1. Gradation Requirements:

**TABLE 02621-1**

Gradation Requirements for Base and Subbase Materials

**Mass Percent Passing**

Sieve Sizes U.S. Standard	BRG Base	BRG S/B	ASTM D 2940**		AASHTO M43	
			GA Base Master Tol.	GA S/B Master Tol.	No. 1	No. 57
4 inch						100
3 ½ inch						90-100
2 ½ inch	100	100				25-60
2 inch			100	-2	100	-3
1 ½ inch			95-100	±5	90-100	±5
1 inch	85-100	90-100				0-15
¾ inch			70-92	±8	60-85	±10
½ inch	60-100	60-100				0-5
3/8 inch			50-70	±8	40-70	±10
No. 4			35-55	±8	30-60	±10
No. 8						0-10
No. 10	35-75	35-90				0-5
No. 30			12-25	±5		
No. 40	20-50	20-55			10-25	±5
No. 200	3-20	5-25	0-8	±3	0-12	±5

\*\*Job mix tolerances will permit acceptance test results outside the Master range.

Aggregate physical properties shall meet the requirements, as outlined in Section 901, Table 901B of the "MSHA Standard Specifications for Construction and Materials (1993)".

2. Graded Aggregate for Base Course

Graded aggregate for base course shall meet the gradation and other requirements of ASTM D 2940 for bases with the following modifications. The liquid limit and plasticity index values shall not be greater than 30 and 6, respectively. Soil fines passing the No. 200 sieve may be tolerated. Where no fines are present, the liquid limit and plasticity index requirements will be waived. The limit for material smaller than the 0.020 mm size and the requirement for sand equivalent will be waived.

3. Coarse Aggregate for Base Course

Coarse aggregate for base course shall meet the gradation requirements of AASHTO M 43, No. 57 as indicated in Table 02621-1.

4. Fine Aggregate for Base Course

Fine aggregate for base course shall be Type II Borrow as specified in Section

02240.02.

5. Bank Run Gravel

a. General

The quality and laboratory test methods shall meet the requirements of Section 02621.01 except that the plasticity index shall not exceed 9.

b. Base Course

Bank run gravel for base course shall meet the BRG-Base gradation requirements of Table 02621-1.

c. Subbase Course

Bank run gravel for subbase course shall meet the gradation requirements of BRG S/B as indicated in Table 02621-1.

6. Graded Aggregate for Subbase Courses

Graded aggregate for subbase courses shall meet the gradation requirements of ASTM D 2940, GA S/B as indicated in Table 02621-1. In addition, the material shall meet all the other requirements listed in Section 02621.02.

7. Sand Aggregate

For sand aggregate, the coarse aggregate shall be from 35 to 40% by dry weight of the mixed materials.

8. Calcium Chloride

a. Solid Calcium Chloride

Solid calcium chloride shall meet the requirements of AASHTO M 144, Type 1 or Type 2.

b. Calcium Chloride Solution

Calcium chloride solution shall contain 30 to 34% solids. The solution shall contain an approved wetting agent in a quantity designated by the County Engineer. When analyzed on a dry basis in accordance with AASHTO T 143, the residue shall meet the requirements of AASHTO M 144, Type 2.

9. Water

Water, when not obtained from the County potable water system, shall be as specified in Section 02611.02.

**02621.03 EXECUTION**

The subgrade or foundation shall be properly prepared and compacted for at least 500 feet

ahead of placing the base or subbase course material.

**A. Geotechnical and/or County Engineer's Approval**

No material shall be deposited upon a frozen subgrade or foundation nor until the subgrade or foundation has been approved by the Geotechnical Engineer, with the concurrence of the County Engineer.

**B. Gravel Base and Subbase Requirements**

For gravel base and subbase courses, the Contractor will be permitted to mix or blend materials in order to produce a finished product meeting these Specifications. This manipulation may be accomplished at any place convenient to the Contractor and may include the use of chemical additives designed to alter the physical properties of the material.

**C. Handling and Transporting Mixtures**

Plant mixed materials shall be handled and transported so as to minimize segregation and loss of moisture. On long hauls, or in very hot or windy weather, when appreciable quantities of moisture might be lost by evaporation, the County Engineer may require that loads in transit be kept covered with suitable covers. Frequent tests for moisture content will be made at the point of delivery.

**D. Spreading Requirements**

The material shall be uniformly spread over the surface and against previously formed earth shoulders, berms not less than 2 feet wide, or against concrete curbs or gutters. Shoulders or berms shall be built up to the elevation of the top of each uncompacted layer being placed, and the inside edges shall be made as straight and as nearly vertical as practical. Material shall be spread upon the subgrade, foundation, or preceding layer in layers of uniform thickness to give the required compacted depth as shown on the Plans, or established by the Geotechnical Engineer, with the concurrence of the County Engineer. Material may be deposited on the subgrade, foundation, or preceding layer by any method which will prevent segregation of the coarse and fine particles. String lines or iron pipes, set to indicate the required depth, shall be used for the spreading of each layer of the base or subbase course.

If traffic, including construction equipment, is allowed to use the subgrade, foundation, or preceding layer, it shall be distributed over the entire width of the course in such a manner as to aid in obtaining uniform and thorough compaction.

**E. Compaction Requirements**

Immediately after spreading, each layer of the material shall be compacted until the required density is obtained. Prior to and during compaction operations, the moisture content of the material shall be maintained within plus or minus two percentage points of the optimum moisture for the material. The exact moisture content will be specified by the Geotechnical Engineer, with the concurrence of the County Engineer. In case the material does not meet the minimum moisture content before compacting, water shall be added by the Contractor without additional compensation.

**1. Density Requirements**

All courses shall be compacted to a density of not less than 97% of the maximum dry density. In-place density shall be measured as specified in MSMT 350 or 352 or as determined by the Geotechnical Engineer, with the concurrence of the County Engineer.

Should the material fail to meet the specified density, further processing by admixture, reworking, rolling, or other approved methods will be required.

**2. Compaction Operations**

Compaction operations, except on superelevated curves, shall begin at the sides of the course, overlap the shoulder or berm at least 1 foot and progress toward the center parallel to the center line of the roadway. Superelevated curve compaction shall begin at the low side of the superelevation and progress toward the high side. The compaction operation shall continue until all compaction marks are eliminated and the course is thoroughly and properly compacted.

**3. Corrective Treatments**

The development of a spongy condition during the rolling process may necessitate a delay in the rolling, a lapse of time to permit drying of the foundation or subgrade, or the complete removal and reconstruction of the base or subbase course. The latter treatment may include corrective treatment of the foundation or subgrade. Any or all of these treatments shall be done when and as directed by the Geotechnical Engineer, with the concurrence of the County Engineer.

Each layer shall be placed in accordance with the requirements of this section during its construction before receiving any additional layer.

**F. Calcium Chloride Addition**

Calcium chloride shall be applied to the base or subbase when directed by the Geotechnical Engineer, with the concurrence of the County Engineer, in one of the following manners:

**1. Gravel Base**

After each layer of base course has been completed as stipulated herein, for a distance directed by the Geotechnical Engineer, with the concurrence of the County Engineer, calcium chloride shall be applied uniformly to the surface at the rate of 1 pound per square yard to the width constructed. A second application at the same rate may be applied to the top most layer. If the second application is made, a period of 2 weeks shall elapse between the first and second application. Base surfaces that are dry shall be sprinkled immediately before applying calcium chloride.

**2. Graded Aggregate Base**

Calcium chloride shall be added at the mixer at the rate of 7.0 pounds of Type I, Regular Flake, or 5.733 pounds of Type II, Pellets or Concentrated Flakes per ton of finished mixture.

**3. Sand Aggregate Base**

When calcium chloride is incorporated at a mixing plant, it shall be at the rate required for graded aggregate base. If added at the job site, calcium chloride shall be placed on the surface in an amount directed by the Geotechnical Engineer, with the concurrence of the County Engineer. Base surfaces that are dry shall be sprinkled immediately before applying calcium chloride.

**G. Correction**

If, after the base course has been constructed in accordance with the above requirements, the surface should become distorted or uneven, the Contractor will be required to break same thoroughly by scarifying, mechanically mix, reshape the surface, and compact the base course at the Contractor's own expense. Any irregularities which may develop in the surface during or after construction shall be corrected to the satisfaction of the Geotechnical Engineer, with the concurrence of the County Engineer. This base course shall be constructed and completed at least 500 feet in advance of any succeeding surface course.

**H. Maintenance Requirements**

During construction, and after completion of the base or subbase course(s) and the wearing surface, the entire paved area shall be maintained by the Contractor until surface is treated, paved, or finally accepted. The surface of the course shall be dragged and planed and the wearing surface repaired as often as necessary to maintain it smooth and true to its grade and cross section. Any deficiencies shall be corrected by the Contractor without additional compensation.

**1. Moisture and Dust Restrictions**

If the material does not contain sufficient moisture for proper stabilization, or satisfactory maintenance and protection of traffic against formation of dust during this period, the Contractor shall add the necessary moisture and apply calcium chloride to the completed surface as directed by the Geotechnical Engineer, with the concurrence of the County Engineer.

**2. Time Restrictions**

If surface treatment or paving is included in the Contract, the entire roadway shall be maintained under traffic for a period of 90 actual traffic days, or for a lesser period if in the opinion of the County Engineer thorough stabilization has been obtained.

**I. Test Results**

The Contractor shall supply the County with test results on a bi-weekly basis.

**02621.04 METHOD OF MEASUREMENT****A. Aggregate Base and Subbase Courses**

RESERVED FOR FUTURE USE



**AGGREGATE BASE AND SURFACE COURSES**

**02621-9**

**B. Calcium Chloride**

RESERVED FOR FUTURE USE

**C. Water**

RESERVED FOR FUTURE USE

**02621.05 BASIS OF PAYMENT**

**A. General**

RESERVED FOR FUTURE USE

**B. Aggregate Base and Subbase Courses**

RESERVED FOR FUTURE USE

**C. Calcium Chloride**

RESERVED FOR FUTURE USE

## **SECTION 02622**

### **STABILIZED AGGREGATE BASE COURSE**

#### **02622.01 GENERAL**

##### **A. Description**

Stabilized aggregate base course shall include, but not necessarily be limited to, furnishing one or more courses of aggregate, plant mixed with a stabilizing agent and placed on a prepared surface in accordance with the Contract Documents.

##### **B. Related Work Included Elsewhere**

1. Subgrade preparation; Section 02610.
2. Aggregate base and subbase courses; Section 02621.

##### **C. Quality Assurance**

1. Materials

Quality assurance for stabilized aggregate base course materials shall be as specified in Section 02621.01.

2. Field Tests

Moisture/density and thickness tolerance requirements shall be as specified in Section 02621.01.

##### **D. Submittals**

Submittals for stabilized aggregate base course materials shall be as specified in Section 02621.01.

#### **02622.02 MATERIALS**

##### **A. Materials Furnished by the County**

1. The County will not furnish any materials for stabilized aggregate base courses.
2. The Contractor may obtain water from the County's potable water system, for application to the base courses, in accordance with current County policies and procedures. The Contractor shall contact the Department of Fiscal Services, Meter Section, for requirements. A backflow prevention device must be placed in accordance with the Standard Details prior to drawing County water.

**B. Contractor's Options**

The Contractor may use any of the stabilizing agents specified herein, unless otherwise noted.

**C. Detailed Material Requirements**

## 1. Aggregate

Aggregate shall be as specified in Section 02621.02.

## 2. Portland Cement

Portland cement, Type I or IA, shall be as specified in Section 02651.02.

## 3. Emulsified Asphalts

Emulsified asphalts for stabilization, Grade AE-BM shall be as specified in Section 02611.02.

## 4. Bituminous Emulsion

Bituminous emulsion for sealing shall be as specified in Section 02611.02.

## 5. Water

Water, when not obtained from the County potable water system, shall be as specified in Section 02611.02.

**02622.03 EXECUTION**

The subgrade or foundation shall be properly prepared and compacted for at least 500 feet ahead of placing the base course material.

**A. Temperature Requirements**

No material shall be deposited upon a frozen subgrade or foundation, nor until the subgrade or foundation has been approved by the County Engineer. No material shall be placed when the ambient temperature is at or below 32°F.

**B. Stabilizing Agent Requirements**

The quantity of stabilizing agent will be determined by the County Engineer.

**C. Handling and Transporting Mixtures**

Mixed materials shall be handled and transported to minimize segregation and loss of moisture. On long hauls, or in very hot or windy weather when appreciable quantities of moisture might be lost by evaporation, the County Engineer may require that loads in transit be kept covered. Tests for moisture content will be made at the point of delivery.

**D. Spreading Requirements**

The material shall be uniformly spread over the surface and against previously formed earth shoulders, berms not less than 2 feet wide, or against concrete curbs or gutters. Shoulders or berms shall be built up to the elevation of the top of each uncompacted layer being placed, and the inside edges shall be made as straight and as nearly vertical as practical. Material shall be spread upon the subgrade, foundation or preceding layer in layers of uniform thickness to give the required compacted depth as indicated on the Plans, or established by the County Engineer. The material may be deposited on the subgrade, foundation or preceding layer by any method which will prevent segregation of the coarse and fine particles. String lines or iron pins, set to indicate the required depth, shall be used for the spreading of each layer of the base course.

**E. Traffic Restrictions**

If traffic, including construction equipment, is allowed to use the subgrade, foundations or preceding layer, it shall be distributed over the entire width of the course in such a manner as to aid in obtaining uniform and thorough compaction.

**F. Compaction Requirements**

Immediately after spreading, the material shall be compacted until the required density is obtained. Before and during compaction operations the moisture content of the material shall be maintained within plus or minus two percentage points of the optimum moisture for the material.

1. Density Requirements

Required density shall be measured as specified in MSMT 321 and shall be not less than 95% of the maximum dry density as determined by AASHTO T 180, Method D.

2. Compaction Operations

Compaction operations shall begin at the sides of the course, overlap the shoulder or berm at least 1 foot, and progress toward the center, parallel to the center line of the roadway, except that on superelevated curves rolling shall begin at the low side of the superelevation and progress toward the high side. The compaction operation shall continue until all compaction marks are eliminated and the course is thoroughly and properly compacted. The development of a spongy condition during the rolling process may necessitate a delay in the rolling or a lapse of time to permit drying of the foundation or subgrade, or the complete removal and reconstruction of the base, including corrective treatment of the foundation or subgrade, all of which shall be done under the direction of the County Engineer.

**G. Bituminous Emulsion Seal Coat Requirements**

When a bituminous emulsion seal coat is required for curing, it shall be applied within 48 hours. The finished base course shall be maintained in a moist state by application of water in the form of a light spray applied by a pressure distributor until the seal coat is applied. If directed by the County Engineer, the surface shall be broomed with a rotary broom to remove all loose and extraneous material before the application of the seal coat. The seal coat shall be applied at the rate of 0.2 gallons per square yard with approved distributing equipment. The exact rate and temperature of application may be adjusted by the County

**STABILIZED AGGREGATE BASE COURSE**

**02622-4**

Engineer.

**02622.04 METHODS OF MEASUREMENT**

RESERVED FOR FUTURE USE

**02622.05 BASIS OF PAYMENT**

RESERVED FOR FUTURE USE

## **SECTION 02623**

### **SOIL-CEMENT BASE COURSE**

#### **02623.01 GENERAL**

##### **A. Description**

Soil-cement base course shall include, but not necessarily be limited to, a combination of soil and Portland cement, uniformly mixed, moistened, compacted, finished, and cured by a surface treatment applied in accordance with the Contract Documents.

##### **B. Related Work Included Elsewhere**

1. Embankment; Section 02260.01.
2. Subgrade preparation; Section 02610.
3. Chemically treated subgrade; Section 02611.
4. Aggregate base and subbase courses; Section 02621.
5. Sand asphalt base; Section 02652.

##### **C. Quality Assurance**

###### 1. Materials

Quality assurance for soil-cement base course materials shall be as specified in Section 02621.01.

###### 2. Field Tests

- a. Moisture/density and thickness tolerance requirements shall be as specified in Section 02621.01.
- b. For mixed in-place soil-cement construction, the Contractor shall provide a cement concrete compaction block having dimensions of 18 inch x 18 inch x 9 inch and weighing not less than 200 pounds. One 18 inch x 18 inch x 18 inch working face shall have a level broomed surface. In addition, the Contractor shall furnish an accurate suitable scale for the purpose of checking rates of cement spread.

##### **D. Submittals**

Submittals for soil-cement base course materials shall be as specified in Section 02621.01.

**02623.02 MATERIALS****A. Materials Furnished by the County**

1. The County will not furnish any materials for soil-cement base courses.
2. The Contractor may obtain water from the County's potable water system, for application to the soil-cement base course, in accordance with current County policies and procedures. The Contractor shall contact the Department of Fiscal Services, Meter Section, for requirements. A backflow prevention device must be placed in accordance with the Standard Details prior to drawing County water.

**B. Contractor's Options**

Not applicable.

**C. Detailed Material Requirements**

1. Portland Cement  

Portland cement shall be as specified in Section 02651.02.
2. Water  

Water, when not obtained from the County potable water system, shall be as specified in Section 02611.02.
3. Soil  

Soil shall be Type III Borrow as specified in Section 02240.02, except that the soil shall not contain gravel, stone, or other aggregates retained on a 3-inch sieve or more than 45% retained on a No. 4 sieve.
4. Bituminous Material and Mineral Aggregate  

Bituminous material and mineral aggregate for surface treatment shall be as specified in Section 02642.02.

**02623.03 EXECUTION**

Soil-cement shall be constructed with any approved combination of machines or equipment that will produce results meeting the requirements for soil pulverization, cement content, proportioning of materials, water content, mixing, compaction, finishing, and the application of surface treatment in accordance with these Specifications.

**A. Temperature Restrictions**

Soil-cement base course shall not be constructed upon frozen subgrade, nor until the subgrade has been approved, nor shall mixing be permitted when the air temperature in the shade and away from artificial heat is 40°F or less and falling. Any material previously placed shall be protected from freezing during the 7 day curing period.

**B. Moisture and Cement Quantities**

The exact quantity of cement and the optimum moisture content will be determined by the County Engineer based on samples representing the material to be used in the soil-cement base. This quantity may be revised to meet changing soil conditions as directed by the County Engineer.

**C. Plant Mixing Requirements**

When the soil-cement base is to be constructed using a plant mixed material, the soil, cement, and water shall be mixed to the proportions required by the County Engineer. The material thus produced shall be a uniform and intimate mixture of soil, cement, and water and shall be within the tolerances required.

**D. Subgrade Preparation**

Before other construction operations, the material upon which the soil-cement is to be placed shall be graded, shaped in accordance with the lines, grades, and cross sections shown on the Plans, and compacted in accordance with Section 02610.

**E. Spreading and Time Restrictions**

Shoulders or berms not less than 2 feet wide shall be provided unless the soil-cement is to be placed against concrete curbs or gutters. The mixture shall be placed in a uniform layer by an approved spreader or spreaders. The layer of soil-cement shall be uniform in thickness and surface contour and in such quantity that the completed base shall be in accordance with the grade and cross section. Dumping of the mixture in piles or windrows will not be permitted. Any soil and cement mixture that has not been compacted and finished shall not remain undisturbed for more than 30 minutes. Not more than 30 minutes shall elapse between the manipulation of soil-cement in adjacent lanes at any location except where longitudinal construction joints will be constructed.

**F. Mixed-in-place Soil-cement Construction****1. Soil Base**

For mixed-in-place soil-cement construction, the soil base material shall have been previously constructed under the requirements of Section 02260. The surface of the material to be manipulated shall be shaped to the line, grade, and cross section required for the completed base course.

**2. Pulverizing**

The soil base material shall be pulverized so that at the completion of moist mixing, 100% passes a 1-inch sieve and a minimum of 80% passes a No. 4 sieve exclusive of gravel, stone, or aggregate retained on these sieves.

**3. Moisture and Spreading Restrictions**

The percentage of moisture in the soil at the time of cement application shall not exceed the quantity that will permit a uniform and intimate mixture of soil and cement during mixing operations, and it shall not exceed the specified optimum



moisture content for the soil-cement mixture. The specified quantity of cement shall be spread uniformly on the soil. Spread cement that has been displaced shall be replaced before mixing is started.

4. **Mixing Operations**

After the cement has been applied, it shall be mixed with the loose soil for the full depth of treatment. Mixing shall continue until the cement has been sufficiently blended with the soil to prevent formation of cement balls. Immediately after the soil and cement have been mixed, water shall be incorporated into the mixture as required. Excessive concentrations of water on or near the surface shall be avoided. The application of all mixing water shall be by means of pressure distributing equipment. After all has been applied, mixing shall continue until a uniform and intimate mixture of soil, cement, and water has been obtained.

5. **Restrictions**

The application of cement, mixing, compaction, and finishing operations shall be continuous and completed within 2 hours. All work shall take place in daylight.

**G. Compaction Requirements**

1. **Moisture Requirements**

At the start of compaction, the percentage of moisture in the mixture shall not be more than two percentage points above or below the specified optimum moisture content of the soil-cement mixture.

2. **Density Requirements**

Soil-cement shall be compacted to a density of not less than 100% of the maximum density determined in accordance with AASHTO T 134. In-place density tests shall be measured as specified in MSMT 350.

**H. Finishing Operations**

After compaction, the surface of the soil-cement shall be shaped to the required lines, grades and cross section. If necessary, during the operations, the surface of the base shall be lightly scarified and recompactd to remove any tire imprints or irregularities left by equipment.

**I. Construction Joints**

1. **Transverse Joints**

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

2. **Longitudinal Joints**

Soil-cement for large, wide areas shall be built in a series of parallel lanes of convenient length and width subject to the approval of the County Engineer.

Straight longitudinal joints shall be formed at the edge of each day's construction by cutting back into the completed work to form a true vertical face free of loose or shattered material.

**J. Curing Operations**

The finished soil-cement shall be kept continuously moist by use of a pressure distributor until the bituminous material is placed. Water shall be applied only by a light spray without ponding.

The surface shall be broomed with a rotary power broom to remove all loose and extraneous material before application of surface treatment.

A single surface treatment shall be applied in accordance with the requirements of Section 02644 within 24 hours after the finishing operation for the purpose of curing.

The surface treatment shall be maintained by the Contractor until the paving course above the soil-cement has been placed or the curing period has expired, whichever is later.

Finished portions of soil-cement that are traveled by equipment used in constructing an adjoining section shall be protected to prevent equipment from marring or damaging completed work.

**K. Traffic Restrictions**

Completed portions of soil-cement may be opened, after placement of a wearing surface in accordance with Section 02644, to local traffic and to construction equipment necessary for completion of the finished soil-cement work provided the soil-cement has hardened sufficiently to prevent marring or distorting of the surface by equipment or traffic.

During the 7 day curing period, the finished soil-cement shall not be used as a haul road.

**L. Maintenance Operations**

The Contractor will be required to maintain the soil-cement in good condition until all work has been completed and accepted. Maintenance shall include immediate repairs of any defects that may occur. This work shall be done by the Contractor at the Contractor's own expense and repeated as often as may be necessary to keep the area continuously intact. Faulty work shall be replaced for the full depth of treatment. Any low areas shall be remedied by replacing the material for the full depth of treatment rather than by adding a thin layer of soil-cement to the completed work.

**02623.04 METHOD OF MEASUREMENT****A. Soil-cement Base Course**

RESERVED FOR FUTURE USE

**B. Portland Cement**

RESERVED FOR FUTURE USE

**SOIL-CEMENT BASE COURSE**

**02623-6**

**C. Bituminous Material and Mineral Aggregate**

RESERVED FOR FUTURE USE

**D. Water**

RESERVED FOR FUTURE USE

**02623.05 BASIS OF PAYMENT**

**A. General**

RESERVED FOR FUTURE USE

**B. Soil-Cement Base Course**

RESERVED FOR FUTURE USE

**C. Portland Cement**

RESERVED FOR FUTURE USE

**D. Bituminous Material and Mineral Aggregate**

RESERVED FOR FUTURE USE

**SECTION 02630**  
**STABILIZED SHOULDERS**

**02630.01 GENERAL**

**A. Description**

Stabilized shoulders shall include, but not necessarily be limited to, the construction of stabilized shoulders consisting of a surface course, with or without base course(s), placed on a prepared foundation in accordance with the Contract Documents.

**B. Related Work Included Elsewhere**

1. Underdrains; Section 02510.
2. Subgrade preparation; Section 02610.4.
3. Chemically treated subgrade; Section 02611.
4. Aggregate base and subbase courses; Section 02621.
5. Stabilized aggregate base course; Section 02622.
6. Soil cement base course; Section 02623.

**C. Quality Assurance**

1. Materials

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

2. Thickness Tolerances

The shoulder depth shall be checked for proper thickness by means of test holes or cores at intervals of not more than 1000 linear feet measured along the edge of the pavement.

3. Cross Slope Tolerances

The cross slope of the completed shoulder shall be as shown on the Plans with the tolerances noted in the pertinent construction specification for the material.

The County Engineer may require the Contractor to provide a shoulder template designed to indicate the proper pitch or slope of shoulder surfaces for the full width. When the shoulder template is required, the finished shoulder shall be checked at

intervals determined by the County Engineer.

**D. Submittals**

Submittals for stabilized shoulder materials shall be as specified in the various material sections specified herein.

**02630.02 MATERIALS**

**A. Materials Furnished by the County**

1. The County will not furnish any materials for stabilized shoulders.
2. The Contractor may obtain water from the County's potable water system for construction of stabilized shoulders. The Contractor shall contact the Department of Fiscal Services, Meter Section, for requirements. A backflow prevention device must be placed in accordance with the Standard Details prior to drawing County water.

**B. Contractor's Options**

The Contractor may furnish materials allowed in the various materials sections referenced herein.

**C. Detailed Material Requirements**

1. Underdrains  
Underdrain materials shall be as specified in Section 02510.02.
2. Soil-cement  
Soil-cement materials shall be as specified in Section 02623.02.
3. Aggregate  
Aggregate shall meet the requirements of AASHTO M 43, size Numbers 7 and 8. Gradation shall be as indicated in Table 02630-1.

**TABLE 02630-1**

<u>Sieve Sizes</u> <u>U. S. Standard</u>	<u>Mass Percent Passing</u> <u>AASHTO M 43</u>	
	<u>No. 7</u>	<u>No. 8</u>
3/4 inch	100	-
1/2 inch	90-100	100
3/8 inch	40-70	85-100
No. 4	0-15	10-30
No. 8	0-5	0-10
No. 16	-	0- 5

**02630.03 EXECUTION****A. Time Restrictions**

Shoulders shall be placed and compacted as soon as possible after the roadway surfacing item is complete. In the case of resurfacing or stage construction where traffic is being maintained, shoulder work shall be completed within 48 hours after completion of the surface course for the particular lane which has been placed.

**B. Underdrains**

Underdrains shall be installed in accordance with Sections 02510.03 and 02610.03 when directed by the County Engineer.

**C. Density Requirements**

Materials shall be placed in a completed trench section and finished in accordance with the specifications for the pertinent section involved; however, the required density shall not be less than 95% of the theoretical density obtained by the specified test method designated for the section which covers the material involved.

**D. Combining Courses**

The County Engineer has the option of having bottom and next above similar course of the shoulder constructed as a single composite depth course provided there is compliance with density and compaction requirements.

**E. Surface Treatment**

Number 7 and Number 8 aggregates, Table 02630-1, will be required for cover of the first and second seals respectively when a double surface treatment is specified in the Contract Documents.

**1. Soil-cement Shoulder Treatment**

Soil-cement shall be placed as specified in Section 02623.03 and as follows:

When soil-cement is specified as the finished shoulder course, a double surface treatment without prime coat shall be placed in lieu of the single surface treatment so specified for the curing of soil-cement. The first seal shall be applied within 48 hours after the soil-cement finishing operations.

**2. Treatment of Impervious Surfaces**

When a surface treatment is specified for contrast on relatively impervious surface, Number 8 aggregate, Table 02630-1, will be required.

**02630.04 METHOD OF MEASUREMENT**

RESERVED FOR FUTURE USE

**STABILIZED SHOULDERS**

**02630-4**

**02630.05 BASIS OF PAYMENT**

**A. General**

RESERVED FOR FUTURE USE

**B. Stabilized Shoulders**

RESERVED FOR FUTURE USE