SP- 156055
(New)

SPECIAL PROVISIONS
FOR
CEMENT TREATED SUBGRADE

Scott County
STP-U-1827(672)--70-82

Effective Date
May 16, 2017

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

156055.01 DESCRIPTION.

A. Section Includes.
This work consists of construction of one or more courses of a mixture of soil, cement and water as indicated in the contract documents, and in conformity with the lines grades, thicknesses and typical cross sections shown on the plans for the purpose of stabilizing existing soil properties.

B. Submittals.
- Construction sequencing.
- Material certifications, including mill test reports on each source of cement and individual load tickets for material delivered.

156055.02 MATERIALS.

A. Materials.

1. Cement.
a. Cement shall be Type I or Type I/II meeting the requirements of ASTM C 150. The source of the cement shall be identified and approved in advance of stabilization operations in order that Standard Proctor tests can be completed by the Contractor prior to commencing work.
b. Cement shall be stored and handled in closed weatherproof containers until immediately before distribution. Cement exposed to moisture prior to mixing with soils shall be discarded.

2. Water.
Water used for mixing or curing shall be reasonably clean and free of oil, salt acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water shall meet the requirements of AASHTO T 26. Water known to be of potable quality may be used

without testing.

3. Soil.
Soil for this work consists of materials on the site or selected materials from other sources and shall be uniform in quality and gradation, and shall be approved by the Engineer. The soil shall be free of roots, sod, weeds, and stones larger than 1.5 inches.

B. Composition.

1. Cement.
Cement shall be applied at a rate of 4% by weight for a 12 inch depth of subgrade treatment.

2. Tolerances.
At final compaction, the cement and water content for each course of subgrade treatment shall conform to the following tolerances:

Material	Tolerance
Cement	+0.5%, -0%
Water	+2.0%, -0%

091045.03 CONSTRUCTION.

A. Weather Limitations.
The cement treated subgrade shall not be mixed while the atmospheric temperature is below 40°F or when conditions indicate that temperatures may fall below 40°F within 24 hours, when it is foggy, rainy, or when soil or subgrade is frozen.

B. Equipment.
The equipment required shall include all equipment necessary to complete this item such as: grading and scarifying equipment, a spreader for the cement, mixing or pulverizing equipment, sheepsfoot and pneumatic rollers, sprinkling equipment, and trucks.

C. Construction Methods.

1. General.
It is the primary requirement of this specification to secure a completed stabilized subgrade containing a uniform cement mixture, free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth, and with a smooth surface suitable for placing subsequent courses. The Contractor shall regulate the sequence of work, to apply specified rates of cement, maintain the work, and rework the courses as necessary to meet the above requirements.

2. Pre-Application Grading.
The area to be incorporated with cement shall be graded from at grade to 0.10 feet below final grading lines before incorporation will be allowed. The Contractor will provide the Engineer facilities with which to check proper grading in anticipation of cement incorporation. Pre-application grading shall be based upon the proposed rate and the intent to provide the final 12 inch layer of cement-treated subgrade in conformity with the lines and grades in the plans of said subgrade layer.

3. Cement Application.
a. Cement shall be spread only on areas where the mixing and compaction operations can be completed within 2 hours. The amount of cement spread shall be the amount required to obtain 4% cement content by dry soil unit weight of each layer of the treated subgrade.
b. The cement shall be spread uniformly over the top of the subgrade by an approved

screw-type spreader box or other approved spreading equipment. The cement shall be distributed in such manner that scattering by wind will be minimal. Cement shall not be applied when wind conditions, in the opinion of the Engineer, are detrimental to a proper application.

4. Mixing.

a. The full depth of the treated subgrade shall be mixed with the pulvamixer. Cement shall not be left exposed for more than 30 minutes after application. The pulvamixer shall make two passes to incorporate the cement into the soil. Water shall be added through use of a pulvamixer equipped with a spray bar in the mixing drum capable of applying sufficient quantities of water to achieve the required moisture content of the soil-cement mixture. The system shall be capable of being regulated to the degree as to maintain moisture contents within the specified range.

b. Specified moisture contents shall be established by the Engineer based on Standard Proctor tests with the site soils and the specific cement to be used for the treatment. Final moisture content of the mix, immediately prior to compaction, shall not be below nor more than 2% above the optimum moisture content for maximum density of the mix as determined in accordance with Materials I.M. 309. If moisture contents exceed the specified limits, additional cement may be added to lower the moisture content to the required limits. Lowering moisture contents by aeration following addition of the cement will not be permitted.

5. Compaction.

a. Compaction of the soil-cement mixture shall begin immediately after mixing of the cement and be completed within two hours following incorporation of the cement. The field density of the compacted mixture shall be at least 95% of the maximum density of laboratory specimens prepared from samples taken from the material in place. The specimens shall be compacted and tested in accordance with Materials I.M. 309. Quality control testing by the Contracting Authority shall be performed by a certified Soils Technician.

b. All in-place density testing will be performed by the City at intervals so that each test shall represent no more than 300 square yards.

c. Irregularities, depressions, or weak spots, which develop, shall be corrected immediately by scarifying the area affected, adding or removing material as required, and reshaping and re- compacting. The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other work is placed thereon or the work is accepted.

d. In addition to the requirements specified for density, the full depth of the material shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section is completed, tests will be made by the Engineer. If the material fails to meet the density requirements, it shall be reworked to meet these requirements. Throughout this operation, the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and shall conform with the typical section shown on the plans and to the established lines and grades. Should the material lose the required stability, density, and finish before the next course is placed or the work is accepted; it shall be recompacted and refinished at no additional cost to the Contracting Authority.

6. Finishing and Curing.

a. After the final layer or course of the cement treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The finished surfaces shall not vary more than 3/8 inch when tested with a 16 foot straightedge applied parallel with and at right angles to the subgrade centerline. Any variations in excess of this tolerance shall be corrected by the Contractor, at no additional cost to the Contracting Authority, and in a manner satisfactory to the Engineer.

b. After the cement treated course has been finished as specified herein, the surface shall be protected against rapid drying and maintained in a thorough and continuously moist condition by sprinkling for a period of not less than 3 days or until the pavement section is placed.

7. Thickness.
The thickness of the cement treated subgrade shall be determined by depth checks or cores taken at intervals so that each test will represent no more than 300 square yards or as approved by the Engineer. When the base thickness is deficient by more than 0.5 inch, the Contractor shall correct such areas in a manner satisfactory to the Engineer. The Contractor shall replace, at no additional cost to the Contracting Authority, the base material where borings are taken for test purposes.

8. Maintenance.
The Contractor shall maintain the cement treated subgrade in good condition from the start of work until all the work has been completed, cured, and accepted by the Engineer.

091045.04 METHOD OF MEASUREMENT.
Measurement for the quantities of the items associated with cement treated subgrade will be as follows:

A. Construction of Cement Treated Subgrade.
Square yards, as shown in the contract documents.

B. Cement Material for Subgrade Treatment.
Tons, as directed by Engineer's Representative.

091045.05 BASIS OF PAYMENT.
Payment will be the contract unit price for the items associated with cement treated subgrade as follows:

A. Construction of Cement Treated Subgrade.

1. Per square yard.

2. Payment is full compensation for:
- Roadbed correction,
- Incorporating cement powder into the work,
- Furnishing and applying water
- For doing all work necessary for completion of the cement treated subgrade in compliance with the contract documents.

B. Cement Material for Subgrade Treatment.

1. Tons.

2. Payment is full compensation for furnishing cement powder for incorporation into the work to stabilize subgrade.