SPECIAL PROVISIONS
FOR
CEMENT TREATED SUBGRADE

Plymouth County
NHSX-075-2(99)--3H-75

Effective Date
October 18, 2022

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.

150908.01 DESCRIPTION.

This work consists of constructing a layer that is a mixture of soil, cementitious material (Portland cement) and water in areas as directed by the Engineer, for the purpose of modifying soil properties. Depending on the subgrade treatment option selected by the Contractor, the layer will be located either in the upper portion of the select soil subgrade treatment, or in the soil below the special backfill subgrade treatment, unless modified by the Engineer.

150908.02 MATERIALS.

A. Materials.

1. Portland Cement.

a. Portland cement shall be Type I, Type I/II, or Type IL meeting the requirements of Section 4101 of the Standard Specifications. The source of the cement shall be selected in advance of stabilization operations so 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 meet requirements of Section 4102 of the Standard Specifications.

B. Composition.

1. Application Rate and Location.

Cement shall be applied at a rate of 4% by dry unit weight of soil for a 12 inch layer thickness.

2. Tolerances.
The cement, and water content shall conform to the following tolerances:

Material	Tolerance
Cement	+0.5%, -0%
Water	Per Article 150908.03, C, 4

150908.03 CONSTRUCTION.

A. Weather Limitations.
Do not apply the cement treated subgrade 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. Do not apply cementitious material when wind conditions are detrimental to a proper application, as determined by the Engineer.

B. Equipment.
The equipment required shall include all equipment necessary to complete this item such as: grading and scarifying equipment, a mechanical spreader for the cementitious material, pulvamixer/reclaimer/rotary speed mixer for mixing of soil and cementitious material (disk harrow not allowed), 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 cementitious 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. 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.
Grade the area to be incorporated with cementitious material from at grade to 0.10 feet below final grading lines before incorporation will be allowed. Provide the Engineer facilities with which to check proper grading in anticipation of cementitious material incorporation. Pre-application grading shall be based upon the proposed rate and the intent to provide the final 12 inch layer of treated subgrade in conformity with the lines and grades in the plans of said subgrade layer.

3. Cementitious Material Application.
a. Spread cement only on areas where the mixing and compaction operations can be completed within 2 hours. The amount of cementitious material spread shall be the amount to obtain the required percentage content by dry soil unit weight of each layer of the treated subgrade.
b. Spread the cementitious material uniformly over the top of the subgrade by an approved screw-type spreader box or other approved spreading equipment. Distribute the cementitious material in such manner that scattering by wind will be minimal. Cementitious material may also be applied in slurry form.

4. Mixing.
a. Mix the full depth of the treated subgrade with the pulvamixer, reclaimer, or rotary speed mixer. Do not leave cementitious material exposed for more than 30 minutes after application. All areas must be covered by a minimum of one pass with the mixer. Additional passes may be required if the cementitious material and soil are not uniformly mixed. If needed, add water through use of a mixer 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-cementitious mixture. The system shall be capable of being regulated to the degree as to maintain moisture contents within the specified range.

b. Establish specified moisture contents based on Standard Proctor tests with the site soils and the specific cementitious material to be used for the treatment. Determine moisture content of onsite soils prior to adding cement. Soil moisture content shall not be more than 3.0% above or 1.0% below the optimum moisture content for maximum density of the mix as determined in accordance with Materials I.M. 309 and adjusted by the cement application rate. 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. Begin compaction of the soil-cementitious mixture immediately after mixing of the cement and complete within 2 hours following incorporation of the cement. The field density of the compacted mixture shall be at least 95% of the maximum density based on Standard Procter tests with the site soils and the specific cementitious material to be used for the treatment. Compact and test the specimens in accordance with Materials I.M. 309. Quality control testing shall be performed by a certified Soils Technician.

b. Determine the in-place density of the treated subgrade layer at intervals so that each test shall represent no more than 500 square yards or as approved by the Engineer. Acceptable test methods for in-place density are provided in Materials I.M. 204, Appendix A.

c. Correct irregularities, depressions, or weak spots, which develop, immediately by scarifying the area affected, adding or removing material as required, and reshaping and re-compacting. Maintain the surface of the course 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, compact the full depth of the material to the extent necessary to remain firm and stable under construction equipment. Throughout this operation, maintain the shape of the course 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; recompact and refinish at no additional cost to the Contracting Authority.

6. Finishing and Curing.

a. After the final layer or course of the treated subgrade has been compacted, bring to the required lines and grades in accordance with the typical sections. The finished surfaces shall not vary more than tolerances specified in Section 2109 of the Standard Specifications. Correct any variations in excess of this tolerance, at no additional cost to the Contracting Authority, and in a manner satisfactory to the Engineer.

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

c. No equipment or traffic beyond that required for maintenance of curing, for construction of other cement treated subgrade, or for property owner access is allowed for 24 hours.

7. Maintenance.

Maintain the treated subgrade in good condition from the start of work until all the work has been completed, cured, and accepted by the Engineer.

150908.04 METHOD OF MEASUREMENT.

Measurement for the quantities of the items associated with treated subgrade will be as follows:

A. Construction of Cement Treated Subgrade.

Square yards, for areas as identified by the Engineer.

B. Cement.
Tons, as computed by the Engineer, from the weights of material delivered. The Engineer will measure the cement in tons through a calibrated pump used for metering the total delivery of the agent or by delivery tanker quantity.

150908.05 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:
- **a.** Roadbed correction,
- **b.** Furnishing and applying water, and
- **c.** For doing all work and testing necessary for completion of the treated subgrade in compliance with the contract documents.

B. Cement.
Per Ton for cement furnished and incorporated in the work.