SP-150442
(New)

SPECIAL PROVISIONS
FOR
FLY ASH OR CEMENT TREATED SUBGRADE

Johnson County
IMN-380-6(321)2--0E-52

Effective Date
October 16, 2018

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.

150442.01 DESCRIPTION.

A. Section Includes.
This work consists of construction of one or more courses of a mixture of soil, cementitious material (Class C Fly Ash or Portland 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.

1. Construction sequencing.

2. Material certifications, including mill test reports on each source of cement and individual load tickets for material delivered.

150442.02 MATERIALS.

A. Materials.

1. Fly Ash or Portland Cement.

a. Fly ash shall meet ASTM C 618, Section 4.3 when sampled and tested in accordance with ASTM C 618, Sections 5, 6, and 8, unless otherwise shown on the plans. Note 2 of Section 3.1.2 of ASTM C 618 will not apply. Fly ash shall be Class C containing a minimum of 22% CaO. The source of the ash shall be identified and approved in advance of stabilization operations in order that laboratory tests can be completed prior to commencing work.

b. Portland Cement shall be Type I or Type I/II meeting the requirements of ASTM C150. 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.

c. Fly ash and cement shall be stored and handled in closed weatherproof containers until immediately before distribution. Fly ash or 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 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. Fly Ash.
Fly ash shall be applied at a rate of 15% by dry unit weight of soil for a 12 inch depth of subgrade treatment.

2. Cement.
Cement shall be applied at a rate of 4% by dry unit weight of soil for a 12 inch depth of subgrade treatment.

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

Material	Tolerance
Fly Ash	+1.0%, -1.0%
Cement	+0.5%, -0%
Water	+2.0%, -2.0%

150442x.03 CONSTRUCTION.

A. Weather Limitations.
The fly ash or 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 cementitious material, 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 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. 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 cementitious material shall be graded from at grade to 0.10 feet below final grading lines before incorporation will be allowed. The Contractor shall 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.** Fly ash or cement shall be spread 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.** The cementitious material shall be spread uniformly over the top of the subgrade by an approved screw-type spreader box or other approved spreading equipment. The cementitious material shall be distributed in such manner that scattering by wind will be minimal. Cementitious material 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. Cementitious material shall not be left exposed for more than 30 minutes after application. The pulvamixer shall make two passes to incorporate the cementitious material 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-cementitious 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 cementitious material to be used for the treatment. Final moisture content of the mix, immediately prior to compaction, shall not be more than 2% above or below 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-cementitious 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.** The in-place density of the treated subgrade layer shall be determined at intervals so that each test shall represent no more than 300 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.** 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 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 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 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 treated subgrade in good condition from the start of work until all the work has been completed, cured, and accepted by the Engineer.

150442.04 METHOD OF MEASUREMENT.

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

A. Construction of Fly Ash or Cement Treated Subgrade.

Square yards, as shown in the contract documents.

B. Fly Ash or 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.

150442.05 BASIS OF PAYMENT.

Payment will be the contract unit price for the items associated with cement treated subgrade as follows:

A. Construction of Fly Ash or 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 necessary for completion of the treated subgrade in compliance with the contract documents.

B. Fly Ash or Cement.

Per Ton for fly ash or cement furnished and incorporated in the work.