SP-154069
(New)

SPECIAL PROVISIONS
FOR
FULL DEPTH RECLAMATION WITH CEMENT STABILIZATION

Page County
FM-C073(146)--55-73

Effective Date
June 20, 2023

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.

154069.01 DESCRIPTION.

A. General.
This work consists of securing a completed stabilized subgrade containing a uniform mixture of reclaimed roadbed, aggregate and cement, 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 the placement of a seal coat surface.

B. Submittals.

1. Construction sequencing.

2. Results of Standard Proctor moisture-density relationships, moisture content, and in-place density tests of the cement treated soil.

3. Material certifications, including mill test reports on each source of cement.

154069.02 MATERIALS.

A. Aggregate.
Shall be as per **Article 4120.06** of the Standard Specifications.

B. Soil/Reclaimed Material.
Ensure the reclaimed roadbed conforms to the following gradation. The gradation may be revised with the Engineer's approval, but ensure the top size of the material does not

exceed 25% of the depth of the compacted recycled mat.

Sieve Size	% Passing
1 1/2 inch	98 to 100
1 inch	90 to 100

C. Cement.

1. Cement shall be ASTM C150 Type I or Type I / II or ASTM C595 Type 1L

2. 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.

3. 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.

D. 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.

E. Mix Design.

1. The Contractor shall develop a mix design by testing the reclaimed mixture to determine the amount of cement required to be incorporate into the reclaimed mixture to meet the target design cement content and the amount of water required for optimum compaction moisture. The mix design will be reviewed and approved by the Engineer.

2. Mix design moisture content shall be established based on the Standard Proctor tests of the reclaimed roadbed, aggregate and designed cement.

3. The amount of cement required to meet the target design cement content shall be determined by the dry soil unit weight.

4. The target design cement content shall be as specified in the contract documents.

154069.03 CONSTRUCTION.

A. General.

1. Perform full depth reclamation between April 1 and November 1 unless otherwise specified in the contract documents.

2. Do not perform reclaiming operations when the weather conditions are such that proper mixing, shaping, and compacting of the reclaimed material cannot be accomplished. Do not perform mixing when it is foggy, rainy, or when soil or subgrade is frozen, or will be within 24 hours.

3. The cement treated subgrade shall not be mixed while the atmospheric

temperature is below 40°F or when weather conditions indicate that temperatures may fall below 40°F within 24 hours.

B. Equipment.

1. Furnish a self-propelled machine capable of reclaiming the existing roadbed to the width and depth shown in the contract documents. Ensure the machine meets the following:

a. Equipped with automatic depth control and maintain a constant cutting depth and width.

b. Capable of pulverizing the roadbed to the required gradation.

c. Equipped with a system capable of adding sufficient quantities of water, with a spray bar in the mixing drum, to meet the requirements of the mix design. This system shall be capable of being regulated to the degree as to maintain the moisture content within the range specified in the mix design.

d. Capable of mixing the reclaimed material, aggregate, cement and water into a homogeneous mixture.

2. Screw-type spreader box or other approved spreading equipment that is capable of distributing the cement uniformly.

3. Use rollers meeting the requirements of **Article 2001 .05** of the Standard Specifications for compacting the reclaimed material. As a minimum, have the following rollers available for use:

a. Sheepsfoot or padfoot roller.

b. Double drum steel roller (may be used in the static or vibratory mode).

c. 25 ton or greater pneumatic tire roller.

C. Preparation.

Prior to initiating the reclaiming operation, clear all vegetation and debris within the width of the roadbed to be reclaimed.

D. Reclaiming the Existing Roadbed.

Reclaim the existing roadway to the width and depth specified in the contract documents. Additional aggregate shall be incorporated during the reclaiming process. If multiple passes of the equipment are required to reclaim the roadbed to the desired width, use a minimum overlap of 6 inches.

E. Aggregate Application.

Just prior to reclaiming the roadbed, aggregate shall be uniformly spread over the existing roadway at the rate specified in the contract documents.

F. Cement Application.

1. 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 spread in such manner that scattering by the wind will be minimal. Cement shall not be applied when wind conditions, in the opinion of the Engineer, are detrimental to a proper application.

2. The cement shall not be left exposed for more than 30 minutes after application.

3. The cement shall be spread only on areas where the mixing and compaction operations can be completed within 2 hours.

G. Mixing.

1. The full depth of the treated subgrade shall be mixed with the pulvamixer. The pulvamixer shall make two passes to incorporate the aggregate, cement and water into the roadbed.

2. Final moisture content of the mixture, immediately prior to compaction, shall not be below nor more than 2% above the optimum moisture content for maximum density of the mixture as determined in accordance with Materials I.M. 309. If the moisture contents exceed the specified limits, additional cement may be added, at no additional cost to the Contracting Authority, to lower the moisture content to the required limits. Lowering moisture contents by aeration following addition of the cement will not be permitted.

H. Compaction and Shaping.

1. Ensure the following:

a. The field density of the compacted mixture is at least 98% 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.

b. The surface density, based on the 2 inch depth nuclear probe density, is a minimum of 97% of the nuclear probe density measured at 75% of the reclaimed roadbed depth.

2. Perform in-place density and moisture test every 500 feet per lane as per Materials I.M. 334.

3. Quality control testing by the Contractor shall be performed by a certified Soils Technician.

4. Compaction of the reclaimed roadbed, aggregate and cement mixture shall begin immediately after mixing in the cement and water.

5. Perform initial rolling with a sheepsfoot roller until the roller pads walk out of the reclaimed mix. Shaping to achieve plan cross slope should cut deep enough to remove the sheepsfoot roller marks. 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.

6. Irregularities, depressions, or weak spots which develop, shall be corrected immediately by scarifying the area, adding or removing material as required, reshaping and re-compacting. The surface shall be maintained in a smooth condition, free of undulations and ruts, until the seal coat surface is placed.

7. In addition to the requirements specified for density, the full depth of the material shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. Throughout this operation, the shape of the roadway shall be maintained by blading and the surface upon completion shall be smooth and shall conform to the typical section shown in the contract documents. Should the material lose the required stability, density, and finish before the seal coat surfacing is placed; it shall be re- compacted and refinished at no additional cost to the Contracting Authority.

I. Curing.

1. After the cement treated subgrade 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 seal coat surfacing is placed.

2. The cement treated subgrade shall be protected against traffic for the first 24 hours.

J. Thickness

The thickness of the cement treated subgrade shall be determined by depth checks or cores taken at intervals so that each test represent no more than 900 square yards. 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.

K. 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 seal coat surfacing placed.

154069.04 METHOD OF MEASUREMENT.

Measurement will be as follows:

A. Full Depth Reclamation.

Square yards satisfactorily completed computed from the measured longitudinal length of roadbed reclaimed to the nearest 1 foot and the width in the contract documents.

B. Aggregate.

Per ton, to the nearest 0.01 ton, of aggregate furnished as per scale tickets.

C. Cement.

Per ton, to the nearest 0.01 ton, of cement furnished as per scale tickets.

154069.05 BASIS OF PAYMENT.

Payment will be the contract unit price as follows:

A. Full Depth Reclamation.

1. Per square yards.

2. Payment is full compensation for:

- Preparation.
- Reclaiming the existing roadbed.
- Aggregate - spreading and incorporation.
- Cement - incorporation.
- Furnishing and applying water.
- Mixing.
- Compaction and shaping.
- Curing.
- Maintenance.

B. Aggregate.

1. Per ton.

2. Payment is full compensation for furnishing, hauling and spreading.

C. Cement.

1. Per ton.

2. Payment is full compensation for furnishing, hauling and spreading.