SP-154061
(New)

SPECIAL PROVISIONS
FOR
FULL DEPTH RECLAMATION WITH CEMENT STABILIZATION

Fremont County
STBG-SWAP-C036(90)--FG-36
STBG-SWAP-C036(91)--FG-36

Effective Date
July 19, 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.

154061.01 DESCRIPTION.

A. General.
This work consists of constructing a mixture of reclaimed roadbed, aggregate, cement and water as indicated in the contract documents, and in conformity with the thicknesses and typical cross section shown on the plans for the purpose of stabilizing the roadbed.

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. Results of the Minimum 7 Day Unconfined Compressive Strength Test.

4. Mix design.

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

154061.02 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 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.

2. 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 known to be of potable quality may be used without testing.

E. Mix Design.

1. The Contractor shall develop a mix design by sampling and testing the mixture of reclaimed roadbed and incorporated aggregate to determine the amount of cement required to be incorporate into the reclaimed mixture to meet the Minimum 7 Day Unconfined Compressive Strength requirement in the contract documents. The mix design will be reviewed and approved by the Engineer.

2. The water required for optimum compaction shall be established based on the Standard Proctor tests of the reclaimed roadbed, aggregate and designed cement.

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

154061.03 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: pulverizing or mixing equipment, a spreader for the cement, 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 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 Double Seal Coat surface.

2. 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.

3. **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.

4. **Pre-Application Grading.**
   Prior to the incorporation of the cement, the roadbed shall be graded to the typical cross section in the plans before the incorporation will be allowed

5. **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 the minimum 7day unconfined compressive strength requirement specified in the plans.
   - **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 a 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 the proper application.

6. **Mixing.**
   - **a.** The full depth of the treated subgrade shall be mixed with the pulvimixer. Cement shall not be left exposed for more than 30 minutes after application. The pulvimixer shall make two passes to incorporate the cement into the soil. Water shall be added through the use of a pulvimixer 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 Independent Testing Laboratory, hired by the Contractor, based on Standard Proctor test 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 the moisture contents exceed the specified limits, additional cement may be added to lower the moisture content to the required limits. Lowering the moisture contents by aeration following addition of the cement will not be permitted.

7. **Compaction and Shaping.**
   - **a.** Compaction of the soil-cement mixture shall begin immediately after mixing of the cement and be completed within 2 hours following the incorporation of the cement. The field density of the compacted mixture shall be at least 98% of the maximum density of the 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 Independent Testing Laboratory, hired by the Contractor, shall be performed by a certified Soils Technician.
   - **b.** The in-place density of the cement treated subgrade layer shall be determined at intervals so that each test shall represent no more than 310 square yards (200 linear feet, 14 feet wide) 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 place 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 Independent Testing Laboratory, hired by the Contractor. 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 in the plans. Should the material lose the required stability, density and finish before the surface is placed, it shall be recompacted and refinished at no additional cost to the Contracting Authority

8. Finishing and Curing.

a. After the cement treated subgrade has been compacted, it shall be brought to the required lines in accordance with the typical cross section. 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 soil-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 surface course has been placed.

9. 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 200 linear feet per lane 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.

10. Maintenance.

The Contractor shall maintain the cement treated subgrade in good condition from the start of the work until all work has been completed, cured and the surface course placed.

154061.04 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, as per scale tickets. Only material placed according to the contract documents will be measured.

C. Cement.

Per ton, to the nearest 0.01 ton, as per scale tickets. Only material placed according to the contract documents will be measured.

154061.05 BASIS OF PAYMENT.

Payment will be at the contract unit price as follows:

A. Full Depth Reclamation.

1. Per square yard.

2. Payment is full compensation for:
- Reclaiming the existing roadbed.
- Aggregate - incorporation.
- Pre-application grading
- Cement – incorporation.
- Furnishing and incorporating water.
- Mixing.
- Compaction and shaping.
- Finishing and Curing.
- Maintenance.

B. Aggregate.

1. Per ton of aggregate furnished and incorporated into the project.

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

C. Cement.

1. Per ton for cement furnished and incorporated into the project.

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