

Section 542

1 The above prices and payments will be full compensation for all work covered by this section
2 including, but not limited to, the furnishing of water and aggregate; the mixing, proportioning,
3 hauling and spreading of the materials; furnishing Portland cement at the point where it is
4 incorporated into the mix; manipulating, compacting and finishing the base; maintaining the
5 base; making repairs or corrections to the base; and applying sand seal in accordance with
6 Article 542-3.

7 If the Contractor fails to provide sand seal as required and the Engineer has the work
8 performed by other forces, the cost of such work will be deducted from monies due or to
9 become due to the Contractor.

10 Payment will be made under

Pay Item	Pay Unit
Aggregate for Cement-Treated Base Course	Ton
Portland Cement for Cement-Treated Base Course	Ton

11 **SECTION 542**
12 **SOIL-CEMENT BASE**

13 **542-1 DESCRIPTION**

14 The work covered by this section consists of constructing and curing a soil-cement base by
15 treating the subgrade, existing subbase or existing base, or any combination of these
16 materials, by pulverizing, adding portland cement, adding aggregate when required, mixing,
17 wetting and compacting the mixture to the required density. Proportion, spread and mix the
18 materials on the roadway; manipulate, compact and finish in accordance with the *Standard*
19 *Specifications* and the lines, grades, depths and typical sections shown on the plans or
20 established by the Engineer.

21 **542-2 MATERIALS**

22 Refer to Division 10.

Item	Section
Aggregate, Std. Size ABC	1005
Portland Cement, Type I	1024-1
Water	1024-4

23 Use soil material that consists of material existing in the area to be paved, approved borrow
24 material or a combination of these materials proportioned as directed by the Engineer that is
25 free from vegetation, roots or other objectionable matter; and does not contain aggregate or
26 stone larger than 2".

27 **542-3 LIMITATIONS**

28 Do not construct the soil-cement base when the air temperature is below 40°F nor when
29 conditions indicate that the temperature may fall below 40°F within 24 hours. Do not place or
30 mix materials with frozen subgrade. Protect the base from freezing for 7 days after
31 completion. Perform the work only during daylight hours except as otherwise provided in the
32 contract.

33 Do not construct soil-cement base that will not be covered with a layer of base or pavement
34 by December 1st of the same year. Failure of the Contractor to cover the soil-cement base as
35 required above will result in the Engineer notifying the Contractor in writing to cover the
36 soil-cement base with a sand seal. Apply the sand seal in accordance with Section 660 except
37 Articles 660-3 and 660-11 will not apply. If the Contractor fails to apply the sand seal within
38 72 hours after a receipt of such notice, the Engineer may proceed to have the work performed
39 with other forces and equipment. The application of the sand seal by the Contractor or other
40 forces will in no way relieve the Contractor of the responsibility to maintain or repair the
41 damaged base, no matter what the cause of damage.

1 542-4 EQUIPMENT**2 (A) General**

3 Use any combination of machines or equipment that will produce the required results meeting
4 the approval of the Engineer. Correct any leakage of fluids and/or materials promptly or the
5 Engineer may order such equipment removed and replaced with satisfactory equipment. Use
6 equipment and methods for applying cement, water, curing seal and blotting sand that will not
7 damage the base and in accordance with Article 107-21.

8 (B) Cement Spreaders

9 Use mechanical spreaders that have an adjustable rate of flow and the capability of
10 spreading the required amount of cement in one pass.

11 (C) Water Distribution Equipment

12 Add water to the soil with a pressure distributor or other suitable equipment capable of
13 uniformly distributing the required amount.

14 (D) Mixers

15 Perform all mixing with a self-propelled rotary mixer. Disc harrows, motor graders and
16 other equipment may be used only to supplement the mixing done by the rotary mixer.

17 Use mixing equipment that is capable of mixing to a compacted depth of at least 10".

18 (E) Compaction Equipment

19 Use self-propelled compaction equipment. Accomplish finish rolling with a pneumatic-
20 tire roller or if permitted by the Engineer, a smooth steel-wheel roller.

21 (F) Scarifying Equipment

22 Use a grader-scarifier for the initial scarification of the soil. Use equipment capable of
23 scarifying the soil to the full depth of the stabilized treatment. When required by the
24 Engineer, use a weeder, spiketooth harrow or nail drag, followed by a broom drag when
25 scarifying during finishing operations.

26 542-5 PREPARATION OF ROADBED

27 Before the addition of any cement to the soil, grade and shape the area to be stabilized in
28 accordance with the typical sections, lines and grades shown on the plans. Perform drying or
29 addition of moisture where necessary before the application of cement. Create the subgrade
30 so it is firm and able to support the construction equipment and compaction operations
31 specified. Correct and make stable, soft or yielding subgrade before construction proceeds.

32 542-6 SCARIFYING

33 Scarify the soil in the area to be stabilized to the required depth and width before application
34 of cement. Pulverizing with a rotary mixer will follow scarifying, except it may be deleted in
35 areas where, if determined, the soil types or conditions make pulverizing with a rotary mixer
36 impractical.

37 542-7 APPLICATION OF CEMENT

38 When the Contractor has brought the subgrade to the elevation required by the plans, the
39 Engineer will sample the soil to be stabilized in order to determine the quantity of cement to
40 be incorporated. Incorporate 24 calendar days into the schedule to allow the Engineer
41 sufficient time to perform the required sampling, testing and final design of the cement
42 stabilization.

43 Before spreading cement, aggregate shall be spread at the rate shown in the plans.

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1 Incorporate cement into the mix at the rate directed by the Engineer. Uniformly spread the
2 quantity of cement required for the full depth of treatment over the surface in one pass. Do
3 not apply cement on excessively wet grade or on windy days.

4 Apply cement to the soil when the percentage of moisture in the soil material is the correct
5 amount that assures a uniform mixture of soil material and cement during the mixing
6 operation. Do not exceed the optimum moisture content established by the Engineer for the
7 soil-cement mixture except by permission.

8 The optimum moisture content and density will be determined in the field by a moisture-
9 density test on representative samples of soil-cement mixture; however, preliminary moisture-
10 density values may be determined by laboratory tests using soils from the project. Moisture
11 content will be determined by the Engineer in accordance with standard test procedures used
12 by the Department.

13 Apply cement only to such an area that all operations shall be completed in the same day
14 during daylight hours. Complete finishing the soil-cement mix within 4 hours of adding water
15 to the soil-cement mixture. No equipment, except that used in spreading and mixing, will be
16 allowed to pass over the freshly spread cement until it is mixed with the soil. Replace all
17 spread cement that has been displaced before mixing is started.

18 **542-8 MIXING**

19 Immediately after the cement has been spread, mix it with the loosened soil material for the
20 full depth of the treatment until a homogenous and uniform mixture is produced. Mixing will
21 be sufficient when 100% of the mixture passes a 1/2" sieve and at least 80% passes
22 a No. 4 sieve, exclusive of any aggregate.

23 Immediately after mixing the soil and cement, add any additional water that is necessary to
24 bring the moisture content between optimum and optimum plus 2% as determined by the
25 Engineer. If moisture content exceeds the specified range, the soil-cement mixture may, if
26 approved by the Engineer, be manipulated by remixing or blading to reduce the moisture
27 content to within the specified range. Avoid excessive concentrations of water as well as wet
28 spots or streaks on or near the surface. After all mixing water has been applied, continue
29 mixing until a uniform mixture is obtained at the required moisture content. Perform the
30 operations of cement spreading, water application and mixing so that they result in a uniform
31 soil, cement and water mixture for the full depth and width of the area being treated. Remix
32 any soil and cement mixture that has not been compacted and finished within 30 minutes.

33 **542-9 COMPACTION**

34 Begin compaction of the mixture immediately after the mixing operation is completed. At the
35 start of compaction, make sure that the moisture in the mixture is no more than 2% above or
36 below the optimum moisture content and is less than the quantity which will cause the soil-
37 cement mixture to become unstable during compaction and finishing. Compact the mixture to
38 at least 97% of that obtained by a moisture-density test using AASHTO T 134 as modified by
39 the Department. Copies of these modified testing procedures are available upon request from
40 the Materials and Tests Unit.

41 Before compaction, prepare the mixture in a loose condition for its full depth. Compact the
42 loose mixture uniformly to the specified density. During the compaction operations, initial
43 shaping may be required to obtain uniform compaction and required grade and cross section.

44 **542-10 FINISHING**

45 When initial compaction is nearing completion, shape the surface of the soil-cement to the
46 required lines, grades and cross section. Maintain the moisture content of the surface material
47 at optimum or higher during finishing operations.

1 If necessary, lightly scarify the surface to remove any tire imprints or smooth surfaces left by
2 equipment. Continue compaction until a uniform and adequate density is obtained.

3 Perform the compaction and finishing to produce a dense surface free of compaction planes,
4 cracks, ridges or loose material.

5 When rain causes excessive moisture, reconstruct the entire section. Where such
6 reconstruction is necessary, furnish all work and cement required.

7 **542-11 THICKNESS**

8 The compacted thickness of the completed soil-cement base will be determined by
9 measurements made in test holes located at random intervals not to exceed 500 ft. Construct
10 the soil-cement base so that the measured thickness does not deviate from that shown on the
11 plans by more than + 1" or - 1/2".

12 Where the base is deficient in thickness by more than 1/2", remove and replace the area of
13 deficient base with base of the required thickness.

14 As an exception to the above, if the deficiency is not considered sufficient to seriously impair
15 the required strength of the soil-cement base, the deficient area may, at the discretion of the
16 Engineer, be left in place.

17 **542-12 CURING**

18 After the cement-treated base has been finished as specified herein, cure it in accordance with
19 Section 543.

20 **542-13 CONSTRUCTION JOINTS**

21 Build soil-cement for large wide areas in a series of parallel lanes of convenient length and
22 width meeting the approval of the Engineer. Form straight longitudinal joints at the edge of
23 each day's construction by cutting back into completed work to form a true vertical face free
24 of loose or shattered material.

25 Construct joints to provide a vertical joint having adequately mixed properly compacted
26 material immediately adjacent to the joint. A longitudinal joint adjacent to partially hardened
27 soil-cement built the preceding day may be formed by cutting back into the previously
28 constructed area during mixing operations. Set guide stakes for cement spreading and mixing
29 if deemed necessary.

30 **542-14 TRAFFIC**

31 Completed sections of the base may be opened when necessary to light-weight local traffic,
32 provided the base has hardened sufficiently to prevent marring or distorting of the surface and
33 provided the curing is not impaired. Do not use construction equipment on the base for
34 hauling except as necessary to discharge into the spreader during paving operations.

35 **542-15 MAINTENANCE**

36 Maintain the soil-cement base in an acceptable condition until final acceptance of the project.
37 Include, in maintenance operations, immediate repair of any defects or damage that may
38 occur. Repeat as often as may be necessary to keep the base in an acceptable condition.
39 Perform repairs to the base by replacing the base for its full depth rather than by adding a thin
40 layer of soil-cement mixture to the existing layer of base.

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1 **542-16 MEASUREMENT AND PAYMENT**

2 *Soil Cement Base* will be measured and paid at the contract unit price per square yard that has
3 been completed and accepted. In measuring this quantity, the width of the base will be
4 measured across the top surface of the base. The length will be the actual length constructed,
5 measured along the centerline of the surface of the base. Measurement will not be made
6 of any base added or replaced for corrective measures during construction or for repairing
7 damaged areas.

8 *Aggregate for Soil Cement Base* will be measured and paid in tons at the contract unit price
9 per ton. The aggregate will be measured by weighing in trucks or certified platform scales or
10 other certified weighing devices. No deductions will be made for any moisture contained in
11 the aggregate at the time of weighing.

12 *Portland Cement for Soil Cement Base* will be paid at the contract unit price per ton that has
13 been incorporated into the mix. When bulk cement is used, the quantity will be measured by
14 weighing in trucks on certified platform scales or other certified weighing devices.
15 Measurement will not be made of any cement added or replaced for corrective measures
16 during construction or for repairing damaged areas.

17 Asphalt curing seal will be paid as provided in Article 543-5.

18 *Blotting Sand* will be paid as provided in Article 818-4.

19 If a layer of soil-cement base is deficient in thickness but has been permitted to be left in
20 place in accordance with Article 542-11, payment for that soil-cement base will be made at
21 50% of the contract unit prices for *Soil Cement Base*.

22 Sand seal applied due to the failure of the Contractor to cover the soil-cement base as required
23 will be incidental to the work of this section. If the Contractor fails to provide sand seal as
24 required and the Engineer has the work performed by other forces, the cost of such work will
25 be deducted from monies due or to become due to the Contractor.

26 Payment will be made under:

Pay Item	Pay Unit
Soil Cement Base	Square Yard
Portland Cement for Soil Cement Base	Ton
Aggregate for Soil Cement Base	Ton

27 **SECTION 543**
28 **ASPHALT CURING SEAL**

29 **543-1 DESCRIPTION**

30 Perform the work covered by this section including, but not limited to, keeping the stabilized
31 layer moist; furnishing and applying the asphalt curing seal; correcting, maintaining and
32 repairing the asphalt curing seal; and blotting sand where directed, to either a chemically
33 stabilized soil layer or to a cement-stabilized base course.

34 **543-2 MATERIALS**

35 Refer to Division 10.

Item	Section
Asphalt, Grade CRS-1	1020-6
Asphalt, Grade CRS-1H	1020-6
Asphalt, Grade CRS-2	1020-6
Asphalt, Grade RS-1	1020-5
Asphalt, Grade RS-1H	1020-5