

SECTION 025215
CEMENT STABILIZED CALICHE BASE (S-47)

1. DESCRIPTION

This specification shall govern all work required to furnish and place all cement stabilized caliche base for this project.

2. MATERIALS

1. Raw Caliche Base: Sample for testing shall be taken prior to mixing with cement.

Material shall be well graded and meet the following requirements when tested in accordance with AASHTO T27:

Sieve Size	% Passing
2"	100
1"	75-95
3/8"	40-75
No. 4	30-60
No. 10	20-45
No. 40	15-30
No. 200	5-20

The material passing the No. 40 sieve, soil binder, shall meet the following requirements:

- a. Liquid limit shall not exceed 45 when tested in accordance with AASHTO T89.
- b. Plasticity index shall not exceed 20 when tested in accordance with AASHTO T90.
- c. Linear shrinkage shall not exceed 10 when tested in accordance with THD TEX-107-E. (Note: The linear shrinkage shall be calculated from the volumetric shrinkage at the liquid limit.)

Coarse aggregate shall have an abrasion loss of not more than 55% when subjected to the Los Angeles Abrasion Test, AASHTO T96.

2. Water: Water shall be free of substances deteriorative to curing of the treated base and shall be approved by the City Engineer.
3. Cement: Cement shall be Type 1 Portland Cement in accordance with ASTM C-150. Cement shall be applied in the amount necessary to produce the desired compressive strength in the finished and cured base, depending on raw caliche used. In most cases, acceptable raw caliche will require cement in the following amount:

Percent by Weight = 7

lb. per sq. yd. for 1" depth = 5.57

In the absence of more precise data, the above amount has been used to estimate the quantity of Portland Cement in the proposal. The Engineer may increase or decrease the amount of cement at his discretion, after representative samples of the caliche have been tested.

4. Asphalt Seal: Asphalt Seal shall be MC70 in accordance with 025404.

3. EQUIPMENT

Equipment necessary for the proper construction of the work shall be on the project, in first-class working condition, and be approved by the Engineer, both as to type and condition, prior to the start of construction operations. The Contractor shall at all times provide sufficient equipment to enable continuous prosecution of the work and its completion in the required number of working days.

Portland Cement treatment for materials in place may be constructed with any machine or combination of machines and auxiliary equipment that will produce results as outlined in this specification.

Mixing may be accomplished by: (1) a multiple-pass traveling mixing plant or (2) a single-pass traveling mixing plant.

The equipment provided by the Contractor shall be operated by experienced and capable workmen and shall be that necessary to provide a cement treatment meeting the requirements herein specified.

4. CONSTRUCTION METHODS

1. General:

It is the primary requirement of this specification to secure a complete course of treated material containing a uniform Portland cement mixture free from laminations 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. It shall be the responsibility of the Contractor to regulate the sequence of his work to process a sufficient quantity of material to provide full depth as shown on plans, to use the proper amount of Portland cement, maintain the work and rework the courses as necessary to meet the above requirements.

Cement treatment shall not be mixed or placed when the air temperature is below 40E and is falling, but may be mixed or placed when the air temperature is above 35E F and is rising, the temperature being taken in the shade and away from artificial heat and with the further provisions that cement treatment shall be mixed or placed only when weather conditions, in the opinion of the Engineer, are suitable.

2. Test Section:

The Contractor shall be required to construct a "Test Section". The first section of cement treated base shall serve as a test section. Its length shall be between 300 and 500 linear feet, typically one block. Evaluation of the equipment and procedure will be done during this section. In case it is found that the work is not satisfactory with respect to the specification requirements, the Contractor shall revise his procedures and augment or replace equipment as necessary to assure work completed in accordance with the specifications. Additional test sections may be required as directed by the Engineer. Test sections not conforming to the requirements of the specifications shall be reconstructed.

3. Placing of Base Material:

After approval of the previous course, base material shall be delivered on the road and placed in windows of uniform sections, then accurately bladed and shaped to required crown and grade to provide a base of compacted depth required by the plans.

4. Final Preparation of Section:

On the day immediately preceding processing, water, as required, shall be added and uniformly mixed full depth with the base material. This operation shall precede cement spreading by at least 12 hours. The section shall then be accurately bladed and shaped to required grade and section.

5. Application of Cement:

The specified quantity of Portland Cement required for the full depth of treatment shall be uniformly spread over the surface. Each pass of the cement spreader shall be positioned by either the curb line or a string line. Cement shall be applied only to such areas as can be completed as herein specified within the daylight hours of the same day. No equipment, except that used in spreading and mixing, will be allowed to pass over the freshly spread cement until it is mixed with the base material.

6. Mixing and Processing:

Either method (a) or (b) below may be used at the option of the Contractor.

- (a) Multiple-Pass Traveling Mixing Plant: After the cement has been applied, it shall be mixed with the base material. Mixing shall continue until the cement has been sufficiently blended with the base material to prevent the formation of cement balls when water is applied. Any mixture that has not been compacted and finished shall not remain undisturbed for more than 30 minutes.

Immediately after the mixing of base material and cement is completed, water, as necessary, shall be uniformly applied and incorporated into mixture. Proper care shall be exercised to insure proper moisture distribution at all times. After the last increment of water has been added, mixing shall continue until a thorough and uniform mix has been obtained.

- (b) Single-Pass Traveling Mixing Plant: After the cement has been applied, it shall be sufficiently mixed with the base material to prevent the formation of cement balls when water is applied. Un-pulverized soil lumps in mixture will not be allowed. Should this condition prevail, the Contractor shall "pre-wet" the raw base material as necessary to correct this condition.

The mixer shall be provided with means for visible and accurately gauging the water application. The water shall be applied uniformly through a pressure spray bar. After cement is spread, mixing operations shall proceed as follows:

The mixer shall, in one continuous operation, mix the base material and cement full depth, add the required moisture uniformly, thoroughly moist-mix the material, cement, and water, spread the completed mixture evenly over the machine processed width of the

subgrade, and leave it in a loose condition ready for immediate compaction.

The mixture shall not remain undisturbed, after mixing and before compacting, for more than 30 minutes.

7. Completion and Finishing:

The material shall be compacted to not less than 98 percent of the maximum dry density as determined by AASHTA T99 Method D. The moisture content of the mixture shall be within 3% of optimum on the wet side.

The surface, upon completion, shall be smooth and in conformity with typical sections and to the established lines and grades. Any deviation in excess of 1/4 inch in cross section and in a length of 16 feet measured longitudinally shall be corrected. All irregularity, depressions, or weak spots which develop shall be corrected by re-priming.

All sections of cement stabilized base shall be processed full width each day without longitudinal construction joints.

Any portion which has a density below that specified herein and which has not properly hardened after a suitable time interval shall be removed and replaced to meet this specification at the expense of the Contractor.

8. Asphalt Seal:

The compacted cement treated base course shall be protected against rapid drying by priming the surface in accordance with 025412. This curing seal shall be applied as soon as practicable, but not later than eight hours after the completion of final compaction. The surface shall be kept moist until the curing seal is applied. It shall be the responsibility of the Contractor to protect the primed surface until surface course is applied.

9. Traffic:

The Contractor shall not be permitted to drive heavy equipment over completed portions, but pneumatic-tired equipment required for hauling cement, and water may be permitted after the surface has hardened sufficiently to prevent the equipment from marring the surface, provided protection and cover specified herein are not impaired. The cement stabilized base may be opened to local traffic as soon as the asphalt seal has been applied and sanded or cured as necessary to prevent it from being picked up by traffic. It may be opened to all traffic after 7 days. Surface coarse shall be applied prior to opening to through traffic.

10. Maintenance:

The Contractor shall be required to maintain at his own expense the entire cement stabilized base within the limits of his contract in good condition satisfactory to the Engineer from the time he first starts work until all work shall have been completed.

Maintenance shall include immediate repairs of any defect that may occur after construction, which work shall be done by the Contractor at his own expense and repeated as often as necessary to keep the area continuously intact. Repairs are to be made in a manner to insure restoration of a uniform surface of good quality cement stabilized base. Faulty work shall be replaced for the full depth of base. Any low area shall be remedied by

replacing the material for the full depth of treatment, rather than adding a thin layer of base material to the completed work.

5. MEASUREMENT AND PAYMENT

Unless indicated otherwise in the Proposal, Cement Stabilized Base will be measured by the square yard, complete in place, for the thickness specified on the plans. Areas will be measured separately for the various thicknesses of Cement Stabilized Base. Portland Cement, actually incorporated in the completed work, will be measured by the ton.