

Bracketed section numbers refer to the 2006 *Standard Specifications*.

Section 24 Stabilized Soils

4-2401 General

Stabilization of underlying soils is critical for successful pavement performance. Methods of stabilizing soils include reworking existing soils with or without additives, or removal and replacement. One method of stabilizing soils is lime stabilization.

Lime stabilization increases the stability of native materials. It is particularly effective for materials containing a large percentage of clay particles. Lime stabilization results from spreading lime over the native material, thoroughly mixing it in place, compacting it at an appropriate moisture content, and curing. The special provisions specify the amount of lime to be added to the native material. If necessary, to achieve the compressive strength designated in the special provisions, the resident engineer may order an adjustment in the percentage of lime to be used.

4-2402 Before Work Begins

Before work begins, take the following steps:

- Obtain samples of the materials to be treated. Request the district materials unit to run initial tests to determine the amount of lime required to meet the design criteria. Advise the contractor of the percent of lime required and optimum moisture content for each soil type.
- If necessary, obtain samples of the water that will be mixed with the soil and lime, and test the water for compliance with the specifications. Generally, potable water will meet the specification requirements.
- Verify that the contractor's quality control laboratory is certified in accordance with Caltrans' Independent Assurance Program.
- Obtain a lime sample with a certificate of compliance, including a statement certifying the lime to be furnished is the same as on the Authorized Material Source List.
- Observe the preparation of the material that will be treated. Ensure the material is scarified and thoroughly broken up to the width and depth specified. Make notes of such inspections in the daily report.
- If required by the specifications, observe a test strip that demonstrates the contractor's equipment and methods provide uniform distribution of lime and achieve the specified compaction.
- If necessary, prepare a change order to provide for the removal and disposal of any oversized material.
- Prohibit lime stabilization when ground temperature is below specified temperature or expected to fall below specified temperature before mixing and compaction can be completed.

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4-2401 General

4-2402 Before Work Begins

4-2403
During the Course of
Work

4-2403 During the Course of Work

Once work begins, do the following:

- Ensure the preparation of the material that requires stabilizing conforms to the requirements in Section 24-2.01D(2) [24-1.04], “Preparing Soil,” of the Standard Specifications.
- For each delivery of lime, obtain the certificate of compliance and the certified weigh slip. Obtain samples of the lime at the frequency rate shown in Section 6-1, “Sample Types and Frequencies,” of this manual.
- Observe the spreading of the lime to determine that the equipment and method used meet the specified requirements.
- Check the spread rate of the lime. When dry lime is spread, the rate of spread may be checked by either of the following means:
 1. Placing building paper on a section before spreading and then weighing the material from a known length of spread (8 to 10 ft), similar to the drop pan or calibration pan method.
 2. Weighing the distributor before and after spreading a known length.
- When lime is spread in a slurry, the rate is normally checked by either of the following means:
 1. Weighing the spreader before and after spreading.
 2. Determining the volume of slurry spread for a known length and reducing the resulting value to the weight of lime.
- Prohibit any method of spreading lime that precludes determining the spread rate. Record daily spread rates, both spot-check and overall, in the daily report.
- Decide how far ahead of the mixing operation the lime may be spread and advise the contractor accordingly. Base the decision on the variables involved in each particular situation. The contractor must not spread the lime so far ahead of the mixing operation that wind might blow it away. Neither must lime in a slurry form be spread so far ahead of the mixing operation that it would dry before being mixed.
- After the spreading of the lime and until the end of the specified curing period, prohibit any traffic, except equipment performing the work, from passing over the native material.
- During the mixing operation and throughout the mellowing period, sample and test the material to ensure the moisture content exceeds the optimum required for compaction.
- Ensure rolling equipment meets specifications.
- Make necessary measurements to ensure the thickness of each compacted layer conforms to the specifications. Note the results of such measurements in the daily report.
- Test the mixture with a phenolphthalein alcohol indicator. If the reaction produces a non-uniform color, require the contractor to perform additional mixing.

- Ensure the depth of mixing meets the required thickness of the stabilized material. Where mixing depth exceeds the specified tolerance, ensure additional lime is added proportionally. Note this in the daily report, including the additional lime quantity provided at the contractor's expense.
- Ensure the contractor completes all mixing within the specified time.
- After final mixing, ensure compaction begins within the specified time.
- To determine maximum density, obtain samples of the mixed material, and test the material before initial compaction.
- Test for compaction in accordance with Section 24-2.03E [24-1.07], "Compaction," of the *Standard Specifications*.
- Ensure any disputes regarding test result discrepancies follow Section 24-2.01D (7), "Test Result Disputes," of the *Standard Specifications*.
- Order trimming of any material above the grade tolerance, and ensure subsequent rolling is performed.
- Ensure the compacted surface is kept moist until the placement of a subsequent layer or curing is applied.
- Ensure the contractor uses one of the specified methods for curing. Also, obtain necessary certificates of compliance and samples where a curing seal is used.
- Ensure the contractor meets the time and temperature requirements for the curing seal. Order any necessary repairs to the damaged curing seal.
- Where a curing seal is used, decide the curing seal's application rate, and advise the contractor accordingly. Base the decision on an amount that will provide a complete membrane without appreciable thickness. To ensure the correct application rate, also check the curing seal's spread rate. Record measured spread rates in the daily report.

4-2404 Measurement and Payment

To determine the pay quantity for lime stabilization, make area measurements of the planned surface.

At the point of delivery, collect weight slips for the lime. Deduct the weight of any wasted or unused lime from the pay quantity for lime and document these quantities in the daily report. If the contractor has added additional lime to compensate for depths exceeding the specified allowance, make the required adjustment to the scale weights of the lime.

Measure the quantity of curing seal in accordance with Section 94, "Asphaltic Emulsions," of the *Standard Specifications*. Payment for water cure or moist material blanket curing methods is included within the lime stabilization pay item.

4-2404 Measurement and Payment