

Section 21 Erosion Control

4-2101 General

4-2102 Materials

- 4-2102A Topsoil
- 4-2102B Fertilizer
- 4-2102C Straw
- 4-2102D Fiber
- 4-2102E Seed
- 4-2102F Tackifier
- 4-2102G Compost

4-2103 Before Work Begins

4-2104 During the Course of Work

4-2105 Seed Sampling

- 4-2105A Scope
- 4-2105B Size of Sample
- 4-2105C Procedure for Sampling
- 4-2105D Sample Preparation, Preservation, and Packaging

4-2106 Quality Assurance Seed Testing Results

- 4-2106A Results
- 4-2106B Nonconformance Procedures

4-2107 Measurement and Payment

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

Section 21 Erosion Control

4-2101 General

Erosion control is covered under Section 21, “Erosion Control,” of the *Standard Specifications*. Erosion control materials are applied to roadside and median areas where erosion control is necessary and where planting may or may not be done in the future. Landscaping involves preparing areas for planting, furnishing and planting plants, and performing plant establishment work. Such landscaping is sometimes combined with erosion control. Landscaping is covered under Section 20, “Landscape,” of the *Standard Specifications*. Refer to Section 4-20, “Landscape,” of this manual for additional information.

For questions about the acceptability of materials and work for erosion control, resident engineers may consult with landscape architects and landscape specialists in the district.

Properly applied erosion control is a key element in preventing water pollution. The success of erosion control work often depends on the time of year that it is applied. Consult with the project landscape architect and landscape specialists if an apparent need exists for changing the order of work or the dates specified for erosion control.

4-2102 Materials

The following provides general information on various materials used in erosion control.

4-2102A Topsoil

Topsoil is the balance of organic matter, sand, clay, and nutrients necessary to support healthy plant life. For the specifications for topsoil, refer to Section 21-1.02D [20-2.01], “Topsoil,” of the *Standard Specifications*. Topsoil that contains large percentages of sand and clay or silt-clay or is deficient in organic matter may be a poor medium for growing plants. High sand content tends to promote dry conditions. High clay content limits aeration and drainage. For good plant growth, the soluble salt content of topsoil generally should not exceed 500 parts per million. If the topsoil’s composition is questionable, laboratory tests can determine the salt content.

Reject any proposed sources for topsoil if the topsoil has too much clay or sand or the topsoil lacks sufficient organic matter. Evidence of poor weed growth is a good indicator that the proposed topsoil source will not support healthy plant growth. If the proposed topsoil source is questionable, consider obtaining a basic soil test.

4-2102B Fertilizer

The *Standard Specifications* or the special provisions cover the requirements for fertilizer, which is expressed as percentages of nitrogen, phosphoric acid, soluble potash, and sulfur. Fertilizer may be spread with seed and other erosion control

Section 21 Erosion Control

4-2101 General

4-2102 Materials

materials using hydroseeding equipment. Fertilizer may also be specified for highway planting.

4-2102C Straw

Straw is the mulch most commonly used to protect slopes and has proven to be an effective method of controlling slope erosion.

Straw provides the following benefits:

- Protects seeded soil from wind, rain, and sun.
- Conserves surface moisture and serves to maintain uniform soil surface temperatures, thereby promoting seed germination and early growth.
- Dissipates the impact of rainfall.
- Slows the velocity of runoff.

4-2102D Fiber

Fiber, as used in erosion control, consists of fine, hair-like tissues processed into small clumps. Natural fiber is derived from wood or other vegetable products.

When properly used, fiber provides the following benefits:

- Protects seed within hydroseeding equipment from the action of pumps and the action of discharge through the nozzle.
- Enables more uniform seed distribution.
- Enhances a visual inspection of seed coverage.
- Forms mulch, covering and anchoring seed to the slope.
- When applied with stabilizing emulsion, bonds straw to the slope.
- Enables seed and commercial fertilizer to be applied by hydroseeding in one application.
- Can be applied by means of a hose to slopes not accessible by other mulching equipment.

The most common method of applying fiber is with hydroseeding equipment. Seed, commercial fertilizers, and tackifier, when specified, usually are applied with the fiber and water in one or more applications. Fiber is used primarily as a carrier. It holds seed on slopes where it is not feasible to incorporate or anchor straw.

4-2102E Seed

Minimum seed purity and germination are usually specified for seed. The purity of seed is defined as the percentage of a specified seed in relation to the total quantity, which includes inert matter, weed seed, and other seed. Seed germination is the percent of pure seed that will grow when tested under laboratory conditions. The percentage of pure live seed (PLS) is the product of percent seed purity and percent germination. (percent PLS = percent purity times percent germination).

4-2102F Tackifier

Tackifier may be applied with fiber and fertilizer. The tackifier increases the amount of fiber, seed, and fertilizer that a slope will retain and, therefore, improves the ultimate production of the desired vegetation.

Manufacturers of tackifier normally specify the amount of water that must be added to the tackifier.

4-2102G Compost

Requirements for compost are covered in *Standard Specifications* Sections 21-1.01C, “Quality Control and Assurance,” and 21-1.02M, “Compost.”

4-2103 Before Work Begins

Before work begins, do the following:

- Review the plans and specifications to determine the specified type of erosion control material and the time of application.
- Verify that Form CEM-3101, “Notice of Materials to Be Used,” includes erosion control materials. Refer to Section 6-202, “Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products,” of this manual for additional information.
- When local topsoil is specified, examine the topsoil to determine that sufficient quantity is available and that it is suitable for the planned use. For possible solutions if the local topsoil appears inadequate, consult with the project landscape architect or landscape specialists. Ensure that sufficient area exists at the top of slopes to stockpile topsoil.
- The contractor must provide the seed vendor’s lab test results. Ensure they are complete and received in a timely manner.
- Erosion control materials are applied at a specified rate, in pounds or tons per acre. Be prepared to measure and compute areas to which erosion control is to be applied so that spread rates may be checked during application.
- Examine equipment to be used in erosion control work to determine if it meets specified requirements.

4-2104 During the Course of Work

As materials for erosion control arrive on the project, and prior to application, do the following:

- Through examination, ensure imported topsoil meets the specified requirements.
- To determine if fertilizer meets specifications, check the chemical analysis on the label of the fertilizer bag. This label generally suffices to determine whether the fertilizer meets the requirements.
- In addition to furnishing certified daily summary weigh sheets, require the contractor to furnish weight tickets with each load of straw delivered to the project. Keep records for the mass of straw delivered to stockpiles. Based on specifications, check for County Agricultural Certification if out-of-county straw is used.
- Ensure the receipt of a certificate of compliance for fiber. Check the labeling on the package for moisture content.
- Verify the species of seed listed on the seed label for consistency with the species listed in the special provisions.
- Compare the percent total viability stated on the vendor seed label with the percent total viability in the special provisions for the seed species.

4-2103 Before Work Begins

4-2104 During the Course of Work

- Ensure that the percent of total weed identified on the seed label is less than the percent stated in the special provisions.
- Verify that no California-prohibited noxious weeds are identified on the vendor seed label.
- Check the seed lot test date. For purity and germination, the seed must have been tested within the past 12 months.
- Check seed package labels and other required documentation. Calculate the weight of PLS in each sack by referring to Section 4-2102E, “Seed,” of this manual.
- Collect seed samples in accordance with Section 4-2105, “Seed Sampling,” of this manual.
- Send the complete package to the Caltrans-contracted seed clearinghouse in accordance with Section 4-2105D, “Sample Preparation, Preservation and Packaging.” Get the name and address of the clearinghouse at:
http://onramp.dot.ca.gov/hq/design/landscape/seed_testing/
- When approving the use of seed with a germination rate lower than the minimum rate specified, application rates must be such that the specified amount of pure live seed is used. Before approving a lower germination rate, consult with the project landscape architect.
- Ensure the receipt of a certificate of compliance for tackifier.

During the application of erosion control materials, do the following:

- Ensure the contractor prepares areas to receive erosion control as required in the specifications.
- Ensure topsoil, duff, or compost is spread uniformly at the specified rate or depth. Ensure the contractor loosens any compacted topsoil.
- Ensure the contractor applies erosion control materials in the specified sequence and application rate.
- When straw is required, determine the spread rate by counting bales and using average bale weights. If the contractor applies the straw pneumatically, suspend the operation if wind conditions cause the straw or visible dust to be blown onto public roadways or across the property line onto private property.
- Observe the amounts and proportions of materials spread or entered into the hydroseeder. You may use sack counts and weights to determine the weights of seed, stabilizing emulsion, fiber, and commercial fertilizer.
- Compute and record the spread rates of the various materials applied. For each day of operation, compute and record the spread rates at least once.

4-2105 4-2105 Seed Sampling
Seed Sampling

Use the following guidelines for obtaining samples for testing.

4-2105A Scope

The purpose of seed testing is to get quality assurance data regarding the purity and viability (germination) of seed. For accurate laboratory test results, seed must be collected and handled to get representative samples. Samples submitted to the laboratory that are not representative can result in inaccurate or erroneous test results.

4-2105B Size of Sample

For each seed lot greater than 2 pounds, take a seed sample of approximately 1 ounce or ¼ cup.

4-2105C Procedure for Sampling

Before handling the seed sample, observe the following requirements:

- Do not touch or sample fungicide-dyed seed, such as dyed red or green seed, or seed labeled “treated seed.”
- Use protective gloves when sampling seed.
- Use clean gloves to avoid affecting the purity of the seed samples.
- Avoid inhaling any dust.

When taking the seed sample:

- Take a seed sample from a newly opened seed bag.
- Do not mix samples from different seed species or seed lots.
- Sample the seed by thrusting your gloved hand into the bag and withdrawing representative portions.
- Take at least seven equal portions of seed from various parts of the bag.
- Place each portion in a clean container and visually examine the seed for uniformity.
- When the portions appear to be uniform, combine them in a glassine lined bag provided by the contractor.

4-2105D Sample Preparation, Preservation, and Packaging

Sample preservation maintains the integrity of the sample from the time of collection until the tests is performed.

- Keep the samples in a suitable and shaded location. Avoid placing samples in a hot or a damp location.
- Identify the contents of each sample by placing the vendor’s original seed label in each bag. Place a custody seal over the bag opening.
- Protect the seed from damage. Package samples in a cardboard box with bubble wrap or insulating peanuts. No additional preservation is necessary.
- Include the following documentation:
 1. Completed Form TL-0101, “Identification Card.”
 2. Copy of the seed requirements from the project special provisions.
 3. Seed vendor’s seed lot test results.
 4. Copy of the vendor’s original seed label.

Send (within 24 hours) the sample and documentation via express mail to the Caltrans contracted seed clearinghouse. The clearinghouse information is located at:

http://onramp.dot.ca.gov/hq/design/landscape/seed_testing/

**4-2106
Quality Assurance
Seed Testing Results**

4-2106 Quality Assurance Seed Testing Results

Consider the following areas when making determinations about seed.

4-2106A Results

Quality assurance testing results will be provided through Caltrans contracted seed clearinghouse.

The clearinghouse contacts the resident engineer by letter with the results of the quality assurance testing in conformance with the specifications. Some potential issues are:

- Species of seed on the seed label does not match the species in the special provisions.
- The percent total viability of the seed is lower than what is specified in the special provisions.
- The percent total weed identified on the vendor seed label is greater than what is specified in the special provisions.
- The presence of California prohibited noxious weeds is identified on the vendor seed label or test results.

4-2106B Nonconformance Procedures

If the contractor fails to comply with the contract specifications for seed, enforce the appropriate contract provisions to ensure compliance based on the nature and severity of the situation. Refer to Section 6 [6-1.04], "Control of Materials," in the *Standard Specifications*.

**4-2107
Measurement and
Payment**

4-2107 Measurement and Payment

From the weight shown on the certified scale sheets, deduct any leftover straw not used in the work. If a "weigh back" certified weight is not available, you may use bale counts and average bale weights for this purpose.

To determine pay quantities, you may use sack counts and sack weights. Make accurate counts, and record them in the project records.

Determine the pay quantity of pure live seed using the germination and purity rates of the bulk seed.