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

Section 25 Aggregate Subbases

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4-2501 General

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Aggregate subbase is designated by class. The bid item list gives the class of aggregate subbase, and the *Standard Specifications* and special provisions provide the requirements for each class.

Aggregate subbase is usually the lowest layer in the pavement structure, as shown in the typical cross sections of the contract plans. Typical cross sections show the thickness of aggregate subbase and layout sheets show where to place it.

4-2502 Before Work Begins

4-2502 Before Work Begins

Before placement begins, review contract plans and specifications to determine the aggregate subbase requirements. For sampling and testing requirements, including frequency of testing, see Chapter 6, "Sampling and Testing," of this manual.

Include the following steps in the preliminary review and inspections:

- Verify the design R-value by testing the basement material at the grading plane to verify the planned thickness shown in the pavement structure. Testing should be completed early enough before the placement of aggregate subbase to allow time for redesign if necessary. (See Topic 614.3, "California R-Value" in the *Highway Design Manual* for a discussion of R-value and pavement structure design.)
- Test potential sources of aggregate subbase when the contractor requests such testing in writing. Deduct applicable Caltrans costs for sampling and testing from contract payments as required under Section 6-2.04 [*6-2.01*], "Local Materials," of the *Standard Specifications*.
- Review compaction tests of the subgrade that is to receive the aggregate subbase. Examine the subgrade to ensure that it has not deteriorated since it was tested and that it is still firm and stable. Give special attention to isolated areas where pumping occurs.
- Measure the subgrade grading plane for compliance with Section 19-1.03C [*19-1.03*], "Grade Tolerance," of the *Standard Specifications*. When measuring for compliance, spot-check areas between stations where stakes are set, as well as the staked locations. Determine the extent of this measurement based on factors such as the nature of material, the efficiency of the contractor's operation, and the accuracy of the grading operation (as indicated during the early stages of checking). The grade will be established from markings on the final grade stakes that Caltrans Surveys set. (See the *Staking Information Booklet* for information on state-furnished construction surveys.)
- When subgrade is cohesionless soil and you decide that the subgrade is unstable for placing aggregate subbase on the roadbed in layers or windrows, give the

contractor written permission to dump aggregate subbase in piles and spread ahead.

- Determine whether the contractor has complied with all requirements related to the use of local materials. See Section 5-1.20B(4) [*6-2.02*], "Contractor-Property Owner Agreement," of the *Standard Specifications*.

4-2503 During the Course of Work

4-2503 During the Course of Work

During work operations, do the following:

- Sample the aggregate subbase at the time it is deposited on the roadbed. Observe delivered aggregate subbase to ensure that it is clean of debris and other deleterious materials. For requirements related to material quality, perform the tests at the frequencies shown in Section 6-1, "Sample Types and Frequencies," of this manual. The frequency table has a provision for waiving the testing for R-value, but exercise caution when doing so. Previous tests must be current. For small amounts (under 500 tons), data from other projects or information from your district's laboratory is usually sufficient. On larger projects, consider using at least one potential source or acceptance test as well as past experience on which to base your decision. Include in the project records an explanation of why you waived R-value testing.
- Compare sand equivalent and grading test results with requirements for operating range and contract compliance. (See Section 3-608A, "Operating Range and Contract Compliance," of this manual.) Note that the volume of aggregate subbase represented by one test for contract compliance is less than that required for testing frequency. It is prudent to take frequent samples, especially with borderline test results, but test only at the frequency shown in the table in Section 6-1 of this manual. If a test result fails to meet the requirement for contract compliance, you may test additional previously taken samples to determine the quantity of material represented by the failing test result.
- Ensure that aggregate subbase is spread on the subgrade without significant segregation. Normally, you would verify this step through observation, but if problems persist, support your observations with a sieve analysis. If segregation is taking place, it can sometimes be avoided by wetting the material before it is hauled to the job or before spreading operations start. Watering and compacting go hand in hand. It is important that the proper amount of water is evenly distributed in the aggregate at the time of compaction.
- Observe the spreading and compacting operation to ensure that it conforms to the layer thickness requirements of the specifications.
- Test the relative compaction of aggregate subbase layers using the area concept procedures under California Test 231. Generally, if the operation is uniform and within specifications, you may decrease testing frequencies.
- Observe the compacting operation to ensure that the material forms a uniformly firm, stable base.
- Measure the surface of the finished aggregate subbase for conformance with tolerances specified in Section 25-1.03D [*25-1.05*], "Compacting," of the *Standard Specifications*. Use the markings on the final grade stakes Caltrans set to determine compliance with the planned elevation of the aggregate subbase surface. Require corrective action for any deficiencies.

- Measure the thickness of the completed aggregate subbase. Use your judgment to determine the number of measurements necessary. The minimum acceptable thickness equals the planned thickness minus the sum of the specified tolerance for high subgrade and the specified tolerance for low finished aggregate subbase surface. A thin section is acceptable if an increased thickness of the base material placed above the aggregate subbase makes up the deficiency. The *Standard Specifications* allow the engineer to accept a deduction for deficient thickness in lieu of other corrective action. Caltrans policy is to ensure that thickness complies with requirements by ordering corrective action if it is deficient. Therefore, apply the deduction in only the most extenuating circumstances. Keep adequate records for payments on progress pay and final estimates.
- Note in the daily report any inspections performed on items that are not otherwise part of a permanent record. For instance, you do not need to note any compaction tests taken because these are recorded elsewhere. However, you do need to explain in the daily report any absence of testing. You also need to note that construction is being performed according to specified layer thicknesses, because this information is not recorded elsewhere.

4-2504 Measurement and Payment

4-2504 Measurement and Payment

- Review quantity calculations found in the resident engineer's pending file to determine if they are sufficiently detailed and accurate to be used in the project records.
- Calculate the aggregate subbase volume based on the dimensions shown on the plans. Make quantity calculations as early in the project as possible.