

WEST VIRGINIA
DIVISION OF HIGHWAYS

DIVISION 300
BASE AND SUBBASE
COURSES

CONSTRUCTION
MANUAL

2002

Table of Contents

<u>Section</u>	<u>Page</u>
301 – 306 <u>RESERVED</u>	
307 <u>CRUSHED AGGREGATE BASE COURSE</u>	307(1)
307.1 GENERAL	307(1)
307.1.1 <u>Description of Work</u>	307(1)
307.1.2 <u>Materials and Equipment</u>	307(1)
307.1.2.1 <u>Materials</u>	307(1)
307.1.2.2 <u>Quality Control and Acceptance</u>	307(2)
307.1.2.3 <u>Equipment</u>	307(2)
307.2 CONSTRUCTION CONSIDERATIONS.....	307(3)
307.2.1 <u>Subgrade/Subbase Preparation</u>	307(3)
307.2.2 <u>Placement</u>	307(3)
307.2.3 <u>Compaction</u>	307(4)
307.2.4 <u>Checking Grade and Thickness</u>	307(4)
307.2.5 <u>Maintenance</u>	307(5)
307.3 RECORDS AND DAILY REPORTS	307(5)
307.4 MEASUREMENT FOR PAYMENT.....	307(5)
308 <u>TRAFFIC BOUND BASE COURSE OR SHOULDER</u>	308(1)
308.1 GENERAL	308(1)
308.1.1 <u>Description of Work</u>	308(1)
308.1.2 <u>Materials and Equipment</u>	308(1)
308.2 CONSTRUCTION CONSIDERATIONS.....	308(1)
308.2.1 <u>Surface Preparation</u>	308(1)
308.2.2 <u>Placement (Reconstruction)</u>	308(1)
308.2.3 <u>Compaction</u>	308(2)
308.2.4 <u>Checking Grade and Thickness</u>	308(2)
308.2.5 <u>Maintenance</u>	308(2)
308.3 RECORDS AND DAILY REPORTS	308(2)
308.4 MEASUREMENT FOR PAYMENT.....	308(2)
309 – 310 <u>RESERVED</u>	

Table of Contents

(Continued)

<u>Section</u>	<u>Page</u>
311 <u>OPEN-GRADED FREE-DRAINING BASE COURSE</u>	311(1)
311.1 GENERAL	311(1)
311.1.1 <u>Description of Work</u>	311(1)
311.1.2 <u>Materials and Equipment</u>	311(1)
311.2 CONSTRUCTION CONSIDERATIONS.....	311(2)
311.2.1 <u>Subgrade/Subbase Preparation</u>	311(2)
311.2.2 <u>Placement</u>	311(2)
311.2.3 <u>Compaction and Curing</u>	311(2)
311.2.4 <u>Checking Grade and Thickness</u>	311(3)
311.2.5 <u>Maintenance</u>	311(3)
311.3 RECORDS AND DAILY REPORTS	311(3)
311.4 MEASUREMENT FOR PAYMENT.....	311(3)
312 – 313 <u>RESERVED</u>	
314 <u>AGGREGATE SUBBASE</u>	314(1)
314.1 GENERAL	314(1)
314.1.1 <u>Description of Work</u>	314(1)
314.1.2 <u>Materials and Equipment</u>	314(1)
314.2 CONSTRUCTION CONSIDERATIONS.....	314(1)
314.3 RECORDS AND DAILY REPORTS	314(1)
314.4 MEASUREMENT FOR PAYMENT.....	314(1)

Section 307

CRUSHED AGGREGATE BASE COURSE

307.1 GENERAL

307.1.1 Description of Work

The purpose of a crushed aggregate base course (CABC) is to:

1. distribute the wheel loads transmitted to the subgrade or subbase, if specified;
2. provide a free-draining underlying material layer; and
3. provide a material layer that is not readily susceptible to frost on which to support the surface course(s).

The Contractor is responsible for furnishing, spreading, and compacting CABC on top of a suitably prepared subbase, or subgrade if a subbase is not specified in the contract. The contract plans may specify one or more courses of CABC. The depth and width of CABC will depend on several factors including:

1. pavement cross-section,
2. anticipated traffic loads,
3. existing soil conditions,
4. frost susceptibility, and
5. drainage requirements.

Occasionally, the depth of CABC may need to be adjusted in the field to accommodate unforeseen conditions once construction has started. In such cases, discuss the issue with the Project Engineer/Supervisor to determine an appropriate action. The Inspector is primarily responsible for checking that the Contractor operates within the requirements of the Contractor's Division-approved Quality Control Plan for CABC and that the CABC is placed and compacted in reasonable conformance to the lines, grades, and thickness of the contract plans,

or as otherwise directed by the Project Engineer/Supervisor. It is extremely important that the Inspector becomes thoroughly familiar with the plans, cross-sections, specifications, and Quality Control Plan to effectively administer the provisions of the contract during construction.

307.1.2 Materials and Equipment

307.1.2.1 Materials

The CABC will generally consist of gravel, crushed gravel, crushed stone, crushed slag, or a combination of these materials uniformly blended to conform to the quality and gradation requirements of the contract. The Contractor must furnish a CABC material that meets these requirements for the class shown on the contract plans. Use the following guidelines during inspection:

1. Material Sources/Laboratory Numbers. It is important to check that the Contractor uses Division-approved material sources and that the material is delivered to the job site with the appropriate laboratory numbers. This will assure the Division that the requisite preliminary sampling and testing has been performed and that the CABC material will be acceptable when delivered and placed.
2. Material Consistency. When first started, closely monitor the operation and visually inspect the material for consistency because it may take the Contractor several attempts to produce a consistently acceptable material. Immediately notify the Project Engineer/Supervisor of suspected problems.
3. Unacceptable Materials. Unless otherwise approved by the Project Engineer/Supervisor,

visor, do not allow the Contractor to deliver or incorporate in the work any CABC material that fails to comply with the quality requirements of the contract with the intent of later upgrading the material in place. Notify the Project Engineer/Supervisor and inform the Contractor to halt CABC operations if it is suspected that an unacceptable material has been delivered. A special investigation may be needed to determine an appropriate course of action, and the Contractor may be required to remove and upgrade the material.

4. Blading/Road Mixing. Visually inspect the operation to make certain that the Contractor does not blend component CABC materials by blading or road mixing. Inform the Contractor that this is an unacceptable practice and to take corrective actions.
5. Stabilization. Pay particular attention to whether the base called for in the contract plan is to be stabilized or unstabilized because the specifications between the two are slightly different.

See Section 701 and Section 702 for additional information on Division requirements and Inspector duties relative to control of materials, (e.g., laboratory numbers, Inspector Daily Reports, standard procedures, visual inspections, identification of samples, rejected materials).

307.1.2.2 Quality Control and Acceptance

In general, the Contractor is responsible for quality control, and the Division is responsible for acceptance. Consider the following guidelines:

1. Quality Control Plan. The Contractor is responsible for preparing and submitting to the Division for approval a Quality Control Plan for CABC that details the sampling and testing methods the Contractor will administer during the work. The Plan will be prepared in accordance with the guidelines

presented in MP 307.00.50 and MP 717.04.21. The Division will review the Plan to ensure conformance to the contract documents. Before CABC work begins, check that the Project Engineer/Supervisor is in receipt of this Plan.

2. Minimum Criteria. Figure 703A presents the Division's minimum sampling and testing criteria for CABC quality, gradation, density, and thickness checks. Acceptance sampling and testing is the Division's responsibility, and the Division may elect to use the Contractor's quality control samples and tests as the basis for acceptance. It is therefore important to inspect CABC operations to make certain the Contractor implements the Quality Control Plan and that the sampling and testing (e.g., sample size, test type, frequency) is consistent with the minimum criteria presented in Figure 703A, MP 307.00.50, and MP 700.00.06.
3. Compaction and Gradation. Acceptance for compaction will be on a lot-by-lot basis determined from nuclear moisture and density tests conducted at random locations in accordance with MP 712.21.26. Acceptance for gradation will be based on test results from consecutive random samples in accordance with the contract specifications. Check that that gradation results are plotted on control charts consistent with the guidelines presented in MP 300.00.51.
4. Aggregate/Compaction Inspectors. Check that sufficient Division-qualified aggregate and compaction inspectors are available to control placement and compaction. See Section 704 for additional information on aggregate and compaction inspectors.

307.1.2.3 Equipment

Do not direct the Contractor regarding equipment type or usage. Unless otherwise directed by the Project Engineer/Supervisor, the

Contractor may choose the equipment needed to haul, spread, moisten, mix, and compact CABC materials. However, the Contractor's equipment operations must not cause undue segregation of the aggregate material, and the compacted CABC must meet the requirements of the contract specifications. Inform the Project Engineer/Supervisor and notify the Contractor if segregation is suspected. Visually inspect any equipment that does not appear to be performing satisfactorily and inform the Contractor to take corrective action. Notify the Contractor of any equipment or operation that is an apparent or obvious safety violation. Do not dictate a method of operation unless it specifically violates the specifications and as long as it is reasonable and consistent with good construction practice.

307.2 CONSTRUCTION CONSIDERATIONS

307.2.1 Subgrade/Subbase Preparation

Before the Contractor begins placing the CABC material, inspect the subgrade/subbase for acceptance in accordance with the requirements of the contract specifications (see Section 228). To achieve a uniform depth of CABC, the subgrade/subbase surface must be constructed and maintained within tolerance of the planned roadway template and profile. Carefully examine the surface to see that it is sufficiently smooth to promote drainage and direct the Contractor to correct any soft spots, ruts, or grade deficiencies by removing and replacing material and/or regrading where necessary. During the operation, periodically monitor the wheel paths of haul trucks. Repetitive trips using the same path may cause deformation or rutting. As practical, haul trucks should travel over the entire surface width. Inform the Contractor not to haul materials under excessively wet conditions or when the surface is sufficiently wet that it can be marred by construction equipment.

307.2.2 Placement

Use the following guidelines to inspect CABC placement operations:

1. Frozen Subgrade. Do not permit the Contractor to place base materials on a frozen subgrade.
2. Spreading Equipment. The Contractor generally will use self-propelled spreading machines or spreader boxes, such as the CMI or Jersey box, to place and spread the aggregate material before compaction.
3. Layers. Typical operations require CABC materials to be placed and shaped on the prepared surface in layers to achieve the total compacted thickness shown on the plans. Visually inspect that the loose aggregate is placed a little in excess of the specified maximum layer thickness to allow for compaction. Check that the Contractor shapes and compacts each layer to the required density before the succeeding layer is placed. The Contractor should maintain a 500 ft (150 m) minimum distance ahead of the succeeding layer; however, do not permit tailgating.
4. Roadway Width. Check that the Contractor spreads the aggregate over the full width of the roadway template without extending one lane too far ahead of adjacent lanes. The Contractor should use two or more spreader boxes to achieve this goal; however, if only one spreader box is used, it must be operated only for a relatively short distance along each lane so that the material is placed across the full roadway width somewhat concurrently along the profile.
5. Segregation. To minimize segregation, check that the Contractor keeps spreader boxes full. It is undesirable for the Contractor to dump the aggregate mixture in piles with the intent of later spreading the piled material with a power grader. This will tend to segregate the larger stones from the

finer resulting in a non-uniform density when compacted. In locations where a power grader must be used, the Contractor must place the aggregate in windrows and uniformly and thoroughly mix the material prior to final spreading and compaction. Where segregation is suspected, discuss the matter with the Project Engineer/Supervisor to determine a corrective action.

6. Finishing. Check that all high spots on the finished grade are trimmed and any excess material disposed of properly. Visually inspect the finished grade for any low spots and, if encountered, have the Contractor scarify the area, add new material, and roll to avoid the formation of surface irregularities.

307.2.3 Compaction

The compaction operation will follow closely behind the placement operation. Because the CABC is such a critical underlying pavement layer, it is imperative that the Contractor compact the CABC to the target density of the contract specifications. Note that moisture content in the aggregate material at the time of compaction and the compactive effort used are two primary factors that will influence the resulting density. Use the following guidelines to inspect CABC compaction operations:

1. Water. It is important to note that additional water may be required to achieve optimum compaction. If additional moisture is needed, it will be determined during the roller pass test section. See MP 700.00.24 for additional information.
2. Compaction Equipment. Unless otherwise specified in the Contract, the Contractor may choose the type of equipment most adaptable to compacting the CABC material. Equipment typically used to apply the necessary compactive effort includes:

- a. pneumatic-tired rollers,
- b. vibratory rollers,
- c. steel-wheeled rollers, and/or
- d. pan-type vibrating compactors.

See Section 307.1.2.3 for additional information on equipment.

3. Layers. Inspect the operation to make certain the Contractor compacts each CABC layer to the specified target density before placing and compacting a succeeding overlying layer. Visually inspect the surface of each compacted layer to see that aggregates are firmly keyed and the surface has a uniform texture. The Contractor must maintain the surface of each compacted layer in an acceptable condition.
4. Density Testing. Density testing for quality control and acceptance must be in accordance with the contract specifications, the Division-approved Quality Control Program, and the minimum sampling and testing criteria presented in Figure 703A. See Section 307.1.2.2 for additional information.
5. Finishing. Check that the Contractor finishes the surface of the top layer of the CABC by blading, if necessary, so that it is true to within the specified tolerance of the lines, grades, and cross-section of the plans.

307.2.4 Checking Grade and Thickness

The finished surface and final depth of the CABC must be constructed within tolerance of the contract plans. Use the following guidelines to perform grade and thickness checks:

1. Grade Checks. Check the grade and shape of the finished surface of the CABC to make certain the resultant cross-section complies with the planned roadway template. This can be performed using one of several methods (e.g., hand level, string line, cross-section). The Division commonly employs the hand-

level method (see Item 6 of Section 207.5.4.2). Check that the finished surface of the CABC does not vary more than $\pm 3/8$ in (± 10 mm) from plan grade. In addition, orient a 10 ft (3 m) long straightedge parallel with the centerline of the pavement at various locations along the surface of the CABC to periodically check for localized high or low spots. Check that the finished surface is within the specified $\pm 3/8$ in (± 10 mm) surface tolerance. Direct the Contractor to correct any deviations by scarifying the local area, adding CABC material, if necessary, reshaping the grade, and recompacting the material to meet the density requirements of the contract.

2. **Depth Checks.** After final compaction, check the CABC for proper thickness. Perform depth checks in accordance with the minimum criteria presented in Figure 703A. Instruct the Contractor to refill all test holes with approved CABC material and recompact the material to meet the density requirements. Check that the total thickness of the final compacted CABC does not vary more than $-1/2$ in (-13 mm) from that specified in the contract plans. Direct the Contractor to correct any deficiencies.

307.2.5 Maintenance

Check that the Contractor adds moisture to the surface, in an amount and frequency determined by the Project Engineer/Supervisor, to prevent loss of fine materials. The Contractor should maintain the surface in a smooth and satisfactory condition for surfacing.

307.3 RECORDS AND DAILY REPORTS

The Project Engineer/Supervisor and Inspectors in charge of the work are responsible for recording in the Daily Reports all information (e.g., observations, measurements, directives to the Contractor) necessary to adequately document the prosecution and progress of the

work that will justify payment to the Contractor and protect the Division from any future claims. The Inspector in charge of the work will maintain a daily record of events in the Inspector's Daily Report. The Project Engineer/Supervisor will maintain the project's Supervisor's Daily Reports. Record keeping is very important because much of the work cannot be readily checked after it is covered by subsequent construction. The Daily Reports are generally the only remaining evidence that the Contractor performed the work as specified in the contract. During CABC inspection, check for load limit violations and record the following additional information in the Inspector's Daily Report:

1. Location and quantity of gradation samples and test results, including laboratory numbers and any degree of non-conformance.
2. Location and result of quality control and acceptance tests for compaction, including laboratory numbers.
3. Location and result of grade checks and depth checks.
4. Measurements for progress and final payments, including extra work payments.

307.4 MEASUREMENT FOR PAYMENT

Measure and pay for CABC work based on the contract unit price and the number of cubic yard (cubic meters) shown in the contract plans. Any additional work approved by the Project Engineer/Supervisor will be measured in cubic yards (cubic meters) in place and paid for as extra work. See Section 104 and Section 109 for additional information on extra work and payment measurements. This will be full compensation to the Contractor for performing acceptable work, including all materials, labor, water, tools, equipment, supplies, and incidentals. Check to make certain that payment for any CABC material that does not conform to

the specified gradation requirements is adjusted based on the degree of nonconformance and the price adjustment schedule in the contract specifications. Use the first price adjustment determined for the subplot. Do not adjust the price of a subplot more than once.

Section 308

TRAFFIC BOUND BASE COURSE OR SHOULDER

308.1 GENERAL

308.1.1 Description of Work

Traffic bound base course and shoulder work is specified for the reconditioning and/or reconstruction of unpaved roadways and shoulders. In general, the work will consist of reconditioning the existing surface by scarifying and reshaping and/or reconstructing the surface, if specified, by placing and compacting additional approved aggregate material. The Inspector is primarily responsible for checking that the Contractor operates within the requirements of the Contractor's Division-approved Quality Control Plan for traffic bound base course or shoulder work and that the base course is placed and compacted in reasonable conformance to the lines, grades, and thickness of the contract plans, or as otherwise directed by the Project Engineer/Supervisor. It is extremely important that the Inspector becomes thoroughly familiar with the plans, cross-sections, specifications, and Quality Control Plan to effectively administer the provisions of the contract during construction.

308.1.2 Materials and Equipment

In addition to the following, the guidelines presented in Section 307.1.2 apply to traffic bound base course and shoulder work. See the contract specifications for additional information.

308.2 CONSTRUCTION CONSIDERATIONS

The following sections apply to both surface reconditioning and reconstruction. Additional aggregate material is typically not specified for

reconditioning. However, reconditioning is performed before new aggregate is placed.

308.2.1 Surface Preparation

Use the following guidelines to inspect the surface preparation operation:

1. Scarification. Check that the Contractor adequately scarifies the existing surface to a depth of 2 in (50 mm), or as otherwise directed by the Project Engineer/Supervisor.
2. Shoulder Cross Slope. If the cross slope of the existing shoulder is greater than a nominal $\frac{3}{4}$ in/ft (6%), check that the Contractor first grades the loose material to plan before placing new aggregate.
3. Contamination. Visually inspect the operation to make certain that subgrade and ditch material does not contaminate the loose material generated by scarification and that such unacceptable materials do not contaminate any newly placed aggregate.
4. Grading. After scarification, check that the Contractor reshapes the loose material to reasonably conform to the grade and cross-section required by the contract plans.

308.2.2 Placement (Reconstruction)

In addition to the guidelines presented in Section 307.2.2, use the following guidelines to inspect the placement of aggregate for traffic bound base course and shoulder reconstruction work:

1. Roadways. Periodically inspect the operation to check that the Contractor spreads the new aggregate evenly over the surface in

an amount sufficient to achieve the required compacted thickness. Check that the Contractor brings the new roadway surface to the proper grade and carefully shapes the surface using a blade grader, or other acceptable equipment, to reasonably conform to the required cross-section.

2. **Shoulders.** Visually inspect the operation to check that the Contractor uniformly spreads the additional aggregate to the required width. If the required compacted shoulder thickness is 3 in (75 mm) or less, check that the uncompacted shoulder material is placed to an elevation at least 1 in (25 mm) higher than the finished elevation of the pavement edge. Otherwise, the elevation of the uncompacted shoulder material must be higher than the elevation of the finished pavement edge in an amount approximately equal to 1 1/3 times the compacted shoulder thickness specified in the plans. Check that the Contractor maintains the required elevation differential when grading and shaping the shoulder before compaction.

308.2.3 Compaction

In addition to the guidelines presented in Section 307.2.3, use the following guidelines to inspect the compaction of traffic bound base course and shoulder materials:

1. **Compaction Procedures.** Check operations to ensure that compaction starts along the outside edge and proceeds toward the center of the roadway. For superelevated curves, compaction should start at the lower edge and proceed upward to the higher edge of the curve. Check that the loosened and/or new aggregate material is firmly keyed after compaction.
2. **Shoulders.** To compact shoulder material adjacent to higher type pavements, the Contractor should use pneumatic tire rollers.

308.2.4 Checking Grade and Thickness

Use the guidelines presented in Section 307.2.4 to check the grade and thickness of traffic bound base course and shoulder work.

308.2.5 Maintenance

Check that the Contractor applies water and/or additional aggregate to keep the base tightly bound and minimize raveling. See Section 307.2.5 for additional guidance.

308.3 RECORDS AND DAILY REPORTS

Document weigh ticket totals, load limit violations, and include the Contractor's written certifications for aggregate materials in the Inspector's Daily Reports. See Section 307.2.2 for additional information on maintaining records and Daily Reports.

308.4 MEASUREMENT FOR PAYMENT

Measure and pay roadway and shoulder reconstruction work based on the contract unit price and the number of tons (Mg) of additional aggregate complete in place. Determine the number of tons (Mg) of aggregate from weigh tickets taken from a Division-approved scale. Measure and pay roadway and shoulder reconditioning work based on the contract unit price and the number of square yards (square meters) shown in the contract plans. Compute the area based on the width and length, measured along the roadway centerline, of base material shown on the plans. Be sure to include and measure separately any authorized areas for widening, turnouts, or intersections. This will be full compensation to the Contractor for performing acceptable work, including all materials, labor, water, tools, equipment, supplies, and incidentals. Check to make sure that payment for any aggregate material that does not conform to the specified gradation requirements is adjusted based on the degree of

nonconformance and the price adjustment schedule of the contract specifications. Do not adjust the price of a subplot more than once.

Section 311

OPEN-GRADED FREE-DRAINING BASE COURSE

311.1 GENERAL

311.1.1 Description of Work

The open-graded, free-draining base course is primarily used by the Division for new construction, reconstruction, and widening projects. The mixture consists primarily of coarse aggregate material with a relatively small amount of fines that is stabilized using either asphalt or Portland cement. The Contractor may choose either type of stabilizer; however, an asphaltic binder is primarily used. The stabilized material is placed and compacted on a prepared surface (i.e., subbase or subgrade) resulting in a durable foundation with relatively large voids to promote drainage to the underlying layer. The Inspector is primarily responsible for checking that the Contractor operates within the requirements of the Contractor's Division-approved Quality Control Plan and that the base course is placed and compacted in reasonable conformance to the lines, grades, and thickness of the contract plans, or as otherwise directed by the Project Engineer/Supervisor.

311.1.2 Materials and Equipment

Consider the following guidelines during inspection:

1. Approved Materials. Check that the Contractor uses only Division-approved materials (e.g., aggregate, performance graded binders, Portland cement, water, curing materials). Record laboratory numbers in the IDR as appropriate.
2. Quality Control Plan. The Contractor is responsible for submitting to the Division for approval a Quality Control Plan, prepared in accordance with the applicable sections of MP 307.00.50 and MP 717.04.21, that details the methods by which the Contractor will implement the quality control program. Check that the Project Engineer/Supervisor is in receipt of the Quality Control Plan and that the Contractor is operating within the Plan's limits.
3. Sampling and Testing. Check that the Contractor provides adequate equipment and personnel to perform the required samples and tests and that material properties are maintained within the limits of the specifications. See Figure 703A for minimum sampling and testing criteria. Unless otherwise specified, compaction testing is not required for open-graded, free-draining bases.
4. Stabilizer Composition. Asphalt cement is limited to 2.0 \pm 0.5% by weight; however, the Project Engineer/Supervisor may increase this limit if blast furnace slag is used. Portland cement, when used as a stabilizer, will be Type 1 with a cement content of 150 \pm 5 pounds per cubic yard (90 \pm 5 kilograms per cubic meter).
5. Preparation and Batching. The Contractor will prepare and batch the stabilized base course mixture in accordance with the Quality Control Plan and the requisite sections of the contract specifications. Note that, prior to mixing, asphalt cement should be heated to within a temperature range of 250°F to 275°F (120°C to 135°C); and before placement, the asphalt mix should be within a temperature range of 200°F to 250°F (95°C to 120°C). Check that the Contractor monitors these temperatures.
6. Mixing and Transporting. For asphalt stabilized bases, check that the Contractor

uses an asphalt concrete mixing plant inspected and approved by the Division, and that the mix is transported to the site in accordance with the applicable requirements of the contract specifications (see Section 401 for additional information). For Portland cement stabilized bases, the Contractor may use an approved central mixing plant, transit mix truck, or a pugmill type mixer (see Section 501 for additional information). Regardless of the type used, check that the Contractor mixes the Portland cement stabilized base a minimum of two minutes after all component materials are batched.

311.2 CONSTRUCTION CONSIDERATIONS

311.2.1 Subgrade/Subbase Preparation

Before placing the open-graded, free-draining base course material, the Contractor must suitably prepare the subbase or subgrade. See Section 307.2.1 for applicable inspection guidelines.

311.2.2 Placement

Use the following guidelines to inspect the placement of open-graded, free-draining bases:

1. Weather Limitations. A stabilized base should only be placed on a dry surface under dry weather conditions. Do not allow the Contractor to place the base material on a frozen subbase or subgrade or when the surface or air temperature fails to meet the requirements of the contract specifications. See Section 401.8 of the **Standard Specifications** for applicable weather restrictions.
2. Equipment. Check that the Contractor's equipment operation does not tear the engineering fabric or damage the perforated pipes of the drainage system. If operated directly on the drainage system, rubber-tired

equipment should be used. Track-based equipment will damage the fabric and pipe. Acceptable equipment includes asphalt pavers for asphalt stabilized bases and spreader boxes, self-propelled spreaders, and conventional concrete placing equipment for Portland cement stabilized bases.

311.2.3 Compaction and Curing

Use the following guidelines to inspect the compaction and curing of the open-graded, free-draining base:

1. Equipment. Check that the Contractor uses a 4 to 10 ton (3.6 to 9.1 Mg) steel wheel tandem roller to compact the asphalt stabilized free draining base material.
2. Mat Temperature. Unless otherwise directed by the Project Engineer/Supervisor, the mat temperature of the asphalt stabilized base at the time of initial rolling will be in the temperature range of 150°F to 175°F (65°C to 80°C). Check that the Contractor is monitoring this temperature.
3. Roller Passes. Unless otherwise directed, check that the Contractor only uses two to three passes to compact the asphalt stabilized base. The objective is to compact the asphalt base sufficiently to support the weight of equipment needed to place the next base layer or surface course without crushing the aggregate and clogging the voids in the layer. The porous nature of the compacted base must be maintained to adequately drain water and operate as designed.
4. Curing. Immediately following the placement of a Portland cement stabilized base, check that the Contractor uses white polyethylene sheeting to properly cure the material in accordance with the contract specifications.

311.2.4 Checking Grade and Thickness

Use the guidelines presented in Section 307.2.4 to check the grade and thickness of the open-graded, free-draining base course.

311.2.5 Maintenance

To operate as designed, the porous nature of the open-graded, free-draining base must be maintained. During construction, visually inspect the base to check that the Contractor is maintaining the surface free from contamination that would clog the voids. Especially watch for deleterious material that may be transported and deposited by construction equipment. The Contractor must maintain the surface free of such deleterious material until the surface course is placed.

311.3 RECORDS AND DAILY REPORTS

See Section 307.2.2 for applicable guidelines on maintaining records and Daily Reports.

311.4 MEASUREMENT FOR PAYMENT

Measure and pay for open-graded, free-draining base work based on the contract unit price and the number of cubic yard (cubic meters) shown on the contract plans. Any additional work approved by the Project Engineer/Supervisor will be measured in cubic yards (cubic meters) in place and paid for as extra work. See Section 104 and Section 109 for additional information on extra work and payment measurements. This will be full compensation to the Contractor for performing acceptable work, including all materials, labor, tools, equipment, supplies, and incidentals.

Section 314

AGGREGATE SUBBASE

314.1 GENERAL

314.1.1 Description of Work

If aggregate subbase is specified, the Contractor is responsible for furnishing, spreading, and compacting one or more courses of subbase aggregate material on top of a suitably prepared subgrade. The Inspector is primarily responsible for checking that the Contractor operates within the limits of the contract specifications and that the subbase is placed and compacted in reasonable conformance to the lines, grades, and thickness of the contract plans, or as otherwise directed by the Project Engineer/Supervisor. See Section 307.1.1 for additional information.

314.1.2 Materials and Equipment

Subbase aggregates are designated as either Grade 1 or Grade 2 as follows:

1. Grade 1. Grade 1 subbase aggregate consists of crushed stone, crushed gravel, crushed slag, crushed chert, crushed red dog, or a combination thereof.
2. Grade 2. Grade 2 subbase aggregate consists of streambed or pit gravel, shale, chert, or red dog, as specified.

The grade of the aggregate subbase will be designated on the contract plans. The aggregate mixture must contain sufficient fine and coarse materials to properly bind and stabilize the subbase. Check that the Contractor furnishes such aggregate material and that the material conforms to the contract specifications. See Section 307.1.2 for additional information.

314.2 CONSTRUCTION CONSIDERATIONS

Use the guidelines in Section 307.2 to inspect the construction of aggregate subbase work.

314.3 RECORDS AND DAILY REPORTS

See Section 307.2.2 for applicable guidelines on maintaining records and Daily Reports.

314.4 MEASUREMENT FOR PAYMENT

Measure and pay for aggregate subbase work complete in place and accepted based on the contract unit price and the number of cubic yard (cubic meters) as determined from the lines, dimensions, and cross-sections shown on the plans, or as otherwise authorized in writing. Do not measure or pay for additional work outside the plan limits. This will be full compensation to the Contractor for performing acceptable work, including all materials, water, labor, tools, equipment, supplies, and incidentals.

