



## SECTION 302

### STABILIZED PERMEABLE BASE

**302.1 Description.** This work shall consist of furnishing and placing a stabilized permeable base material. The mixture shall be placed, spread and compacted as shown on the plans or as directed by the engineer.

**302.2 Material.** All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Section
Aggregate for Drainage	1009
Asphalt Binder	1015
Portland Cement	1019
Water	1070

**302.2.1 General.** Stabilized permeable base shall be either asphalt binder stabilized or Portland cement stabilized at the option of the contractor. All stabilized permeable base shall use Grade 4 drainage aggregate in accordance with [Sec 1009](#).

**302.2.2 Asphalt Stabilized Permeable Base.** Mixtures shall be composed of the base aggregate and 2.5 percent asphalt binder by weight of the total mixture. PG 64-22, PG 70-22 or PG 76-22 asphalt binder shall be used. All proportioning, mixing and transporting shall be in accordance with [Sec 401](#).

**302.2.3 Cement Stabilized Permeable Base.** Cement stabilized base mixtures shall be composed of the base aggregate with a cement factor of 2.5 sacks per cubic yard. All proportioning, mixing and transporting shall be in accordance with [Sec 501](#). Fly ash and ground granulated blast furnace slag shall not be used.

#### 302.3 Construction Requirements.

**302.3.1 Contamination.** Contamination of the finished base material that affects the drainage capability of the product will not be permitted. Any areas determined to be contaminated shall be completely removed without disturbing the adjacent or underlying material and replaced at contractor's expense.

**302.3.2 Displacement.** Rutting or other displacement of the permeable base or the underlying base will not be permitted. If displacement occurs, which could result in ponding or a non-uniform, non-draining thickness of permeable base, the material shall be completely removed without disturbing the adjacent or underlying material and shall be replaced at the contractor's expense.

**302.3.3 Asphalt Stabilized Permeable Base.** Applicable portions of [Sec 401](#) will apply, except as noted herein. The final mixture, when discharged from the pugmill or drum, shall be 250-300 F. A minimum of three passes of a 5 to 10 ton steel wheel roller shall be made, compacting the material until no further displacement is noted. Compaction shall begin as soon after spreading the mixture as the mixture is able to bear the weight of the roller without undue displacement and shall be completed before the temperature of the mixture drops below 100 F. The approximate compacted thickness of a single lift shall be a maximum of 4 inches .

**302.3.4 Cement Stabilized Permeable Base.** Applicable portions of [Sec 502](#) will apply, except as noted herein. Segregation of the mixture shall be minimized. Normal concrete pavement consolidation equipment such as vibrators or vibrating pans will be considered adequate, provided the mixture can be satisfactorily compacted. The mixture shall be cured for a minimum of 48 hours in accordance with [Sec 502.6](#), except that white-pigmented membrane or straw shall not be used. A fine water mist may be applied several times each day for the 48-hour period as needed to maintain moisture. The water application shall not be heavy enough to wash away the cementitious material or mortar.

**302.4 Quality Control.** The contractor shall control and monitor the quality of the work. A QC Plan will not be required.

**302.4.1 Gradation.** The contractor shall sample and determine the gradation of all aggregate used to ensure it meets the requirements in Sec 1009.

**302.4.2 Deleterious.** The contractor shall sample and determine the deleterious content of all aggregate to ensure it does not exceed the limits referenced in Sec 1009.

**302.5 Quality Assurance.** The engineer or designated representative will be responsible for monitoring the work and quality control efforts of the contractor. Results of QA testing will be furnished to the contractor within 24 hours of obtaining the sample.

**302.5.1 Independent QA Samples.** Unless otherwise stated, a favorable comparison shall be obtained when independent QA samples meet the same specification criteria as QC.

**302.5.2 Split QA Samples.** No QA split samples are required for Sec. 302 work.

**302.6 QC/QA Frequency Table.**

Tested Property	QC Frequency	QA Frequency	
		Independent Samples	Split Samples
Gradation	1 per 2000 Tons	1 per Project	-
Deleterious			

**302.7 Method of Measurement.** Final measurement of the completed permeable base will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. Where required, measurement of permeable base, complete in place, will be made to the nearest square yard. The revision or correction will be computed and added to or deducted from the contract quantity.

**302.8 Basis of Payment.** The accepted quantities of permeable base of the thickness specified will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for all labor, equipment and material, including the stabilizing agent, to complete the described work.



## SECTION 304

### AGGREGATE BASE COURSE

**304.1 Description.** This work shall consist of furnishing and placing one or more courses of aggregate on a prepared subgrade in accordance with these specifications, and as shown on the plans or as directed by the engineer. The type of aggregate to be used will be specified in the contract.

**304.2 Material.** Material for Type 1, 5 and 7 aggregate bases shall be crushed stone or reclaimed asphalt or concrete which meet the requirements of [Sec 1007](#).

**304.2.1 Temporary Recycled Material.** The contractor may substitute bituminous pavement cold millings or crushed recycled concrete in lieu of aggregate base for any temporary surface, regardless of the type or thickness of aggregate shown on the plans. If this option is exercised, the contractor shall notify the engineer at least two weeks prior to using the millings or recycled concrete, and shall identify the location from where the millings or concrete will be removed.

#### **304.3 Construction Requirements.**

**304.3.1 Field Laboratory.** When authorized by the engineer, the contractor shall provide a Type 2 field laboratory in accordance with [Sec 601](#). Payment for the laboratory will be made in accordance with [Sec 601](#).

**304.3.2 Subgrade.** All work on that portion of subgrade on which the base is to be constructed shall be completed in accordance with [Sec 209.2.1](#) prior to placing any base material on that portion. Aggregate base shall not be placed on frozen subgrade.

#### **304.3.3 Placing.**

**304.3.3.1** The contractor shall place base material on the roadbed as shown in the contract documents. The maximum compacted thickness of any one layer shall not exceed 6 inches. If the specified compacted depth of the base course exceeds 6 inches, the base shall be constructed in two or more layers of approximately equal thickness. The compacted depth of a single layer of the base course may be increased to 8 inches for shoulders.

**304.3.3.2** Types 1 and 5 aggregate base used for shoulders adjacent to rigid or flexible type pavement, including pavement resurfacing, shall be simultaneously deposited and spread on the subgrade. Aggregate shall not be deposited on the pavement and bladed or dozed into place.

**304.3.4 Shaping and Compacting.** Each layer shall be compacted to the specified density or dynamic cone penetration index value before another layer is placed.

**304.3.4.1** Segregated surface areas constructed of Type 1 aggregate base may be corrected by adding and compacting limestone screenings of such gradation and quantity as required to fill the surface voids, and firmly bind the loose material in place. Screenings used in correcting segregated surface areas will be measured and paid for as base material. Type 5 and Type 7 aggregate bases are intended to provide some drainage and shall not be segregated. Trimmed Type 5 and 7 aggregate base may not be reused until the material is verified as meeting the required specifications. Base material contaminated to the extent that the material no longer complies with the specifications shall be removed and replaced with satisfactory material at the contractor's expense.

**304.3.4.2** Aggregate base shall be compacted to meet the quality control requirements found in this specification. In lieu of the density requirements for Type 1 aggregate base used for shoulders with thicknesses less than 4 inches, the aggregate shall be compacted by a minimum of three complete coverages with a 5 ton roller. Rolling shall be continued until there is no visible evidence of further consolidation.

**304.3.4.3** Water shall be applied to the Type 7 base material during the mixing and spreading operations so that at the time of compaction the moisture content is not less than 5 percent of the dry weight.

**304.3.4.4** If at any time the compacted aggregate base or subgrade ruts, pumps, or otherwise becomes unstable, the contractor, at the contractor's expense, shall restore the earth subgrade and the aggregate base to the required grade, cross section and density.

**304.3.4.5** Millings or recycled concrete shall be installed to the same dimensions shown on the plans for the aggregate base. Millings or recycled concrete shall be placed in maximum 4-inch lifts, and each lift shall be compacted by a minimum of three passes with a 10-ton roller.

**304.3.5 Maintenance.** The contractor shall maintain, at the contractor's expense, the required density and surface condition of any portion of the completed aggregate base until either the prime coat or a succeeding course or pavement is placed.

**304.3.6 Prime Coat.** If a prime coat is specified in the contract, the contractor will be required to apply the prime coat on any completed portion of the aggregate base as soon as practical, or as otherwise specified. The contractor will not be permitted to apply prime if the moisture in the top 2 inches of the Type 1 or 5 aggregate base exceeds the higher of either (1) the average of the optimum moisture as determined by the Standard Compaction Test and the absorption of the plus No. 4 fraction, or (2) two-thirds of the optimum moisture as determined by the Standard Compaction Test.

**304.4 Quality Control.** The contractor shall control operations to ensure the aggregate base, in place, meets the specified requirements. Tests shall be taken at random locations designated by the engineer.

**304.4.1 Deficiency Limits Determination.** When density or DCP index value tests are less than specified or when thickness measurements indicate the thickness is deficient by more than 1/2 inch from the plan thickness, additional measurements will be taken at 100-foot intervals parallel to centerline ahead and behind the tested location until the extent of the deficiency has been determined. Each measurement will be assumed as representative of the full width for a distance extending one-half the distance to the next measurement, measured along centerline, or in the case of a beginning or ending measurement, the distance will extend to the end of the base section. Any deficient areas shall be corrected by reworking or adding material within the limits of the deficiency.

**304.4.2 Rejected Material.** When two consecutive tests for gradation, deleterious material, or plasticity index do not meet the specification limits, the material shall be removed beginning at the point where the first test was conducted.

**304.4.3 Retained Samples.** The contractor shall retain and clearly identify the untested portion of aggregate samples for the engineer's use. The amount retained shall be at least as large as necessary to perform the QA plasticity index, gradation and deleterious testing. The contractor shall retain the samples for 7 days after testing has been completed and the results accepted by the engineer.

**304.4.4 % Density.** Field density for Type 1 and Type 5 aggregate base shall be determined in accordance with AASHTO T 191 or AASHTO T 310, Direct Transmission, for wet density. For sand cone method, the volume of the test hole may be reduced as necessary to accommodate available testing equipment. If nuclear density test methods are used, moisture content will be determined in accordance with AASHTO T 310 and a moisture correction factor applied. Type 1 aggregate base used for shoulders shall be compacted to a minimum 95 percent of standard maximum density. Type 1 aggregate base used on other than shoulders shall be compacted to no less than standard maximum density. Type 5 aggregate base under both roadway and shoulders shall be compacted to a minimum 95 percent of standard maximum density.

**304.4.5 Dynamic Cone Penetrometer Index.** Type 7 aggregate base under both roadway and shoulders shall be compacted to achieve an average dynamic cone penetration (DCP) index value through the base lift thickness less than or equal to 0.4 inches per blow, as determined by a standard DCP device with a 17.6 lb hammer meeting the requirements of ASTM D6951. DCP testing shall occur within 24 hours of placement and final compaction.

**304.4.6 Thickness** The thickness of the placed material shall be monitored using an applicable method meeting engineer's approval.

**304.4.7 Gradation** AASHTO T 11 and AASHTO T 27 shall be utilized to monitor gradation compliance with Sec 1007. Samples shall be taken at point of delivery, prior to rolling.

**304.4.7.1** When production for a week is anticipated to be 1,000 tons or less, the contractor may test the material at a frequency of 1 per 250 tons with a minimum of 1 test per week in lieu of the frequency found in the QC/QA frequency table.

**304.4.8 Deleterious** Using MoDOT TM 71, QC shall determine the deleterious content compliance with Sec 1007. Samples shall be taken at point of delivery, prior to rolling. Small quantities shall follow Sec 304.4.7.1

**304.4.9 Plasticity Index** Using AASHTO T 89 and AASHTO T 90, QC shall determine the PI compliance with Sec 1007. Samples shall be taken at point of delivery, prior to rolling. Small quantities shall follow Sec 304.4.7.1

**304.4.10 Standard Compaction** The contractor shall determine the standard maximum dry density and the optimum moisture content for Type 1 and 5 base materials and supply all test data to the engineer prior to the beginning of work. The Standard Compaction Test will be conducted in accordance with AASHTO T 99, Method C, replacing any material retained on the 3/4-inch sieve, as provided therein. A new standard compaction test shall be performed by QC when there is evidence of changes to the material or as directed by the engineer.

**304.4.11 Dry Weight** The contractor shall determine the dry weight for Type 7 base materials and supply all test data to the engineer prior to the beginning of work.

**304.4.12 Nuclear Moisture Correction Factor.** Whenever nuclear gauges are used for field density, a moisture correction factor will be determined for each aggregate in accordance with MoDOT Test Method TM 35. The contractor shall supply the correction factor and all test data to the engineer prior to the beginning of work.

**304.5 Quality Assurance.**

**304.5.1 Independent QA Samples.** Unless otherwise stated, a favorable comparison shall be obtained when independent QA samples meet the same specification criteria as QC. For Type 1 and 5 base a favorable comparison with the QC standard compaction test shall be obtained when the QA result is within 3.0 pounds. For Type 7 base the QC average DCP penetration index shall compare within 0.1 inches per blow of the QA.

**304.5.2 Split QA Samples.** For retained samples, the QC test results and QA test results shall compare within the following limits. The total deleterious material shall be within 2.0 percentage points. The plasticity index shall be within 2. The gradation test results shall compare within the following limits:

Sieve	Tolerance (%)
1/2-inch and larger	± 5.0
No. 4	± 4.0
No. 8	± 4.0
No. 10	± 3.0
No. 30	± 3.0
No. 40	± 2.0
No. 100	± 2.0
No. 200	± 1.0

**304.6 QC/QA Frequency Table**

Tested Property	QC Frequency	QA Frequency	
		Independent Samples	Split Samples
% Density	1 per 1,000 tons,	1 per 4,000 tons	-

DCP Index	minimum of 1 per day		
Thickness			
Gradation Material	1 per 2,000 tons, minimum of 1 per day	-	1 per 8,000 tons
Deleterious			
Plasticity Index	1 per 10,000 tons		1 per 40,000 tons
Standard Compaction		1 per Project	
Dry Weight	1 per Material		-
Nuclear Moisture Correction Factor		-	

**304.7 Method of Measurement.** Final measurement of the completed aggregate base course will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. Measurement will include aggregate course placed under curb and gutter. Where required, measurement of aggregate base course, complete in place, will be made to the nearest square yard. Where the aggregate base course extends to the inslope of the shoulder, the pay limit of the aggregate base course will be measured from the mid-point of the sloped portion. The revision or correction will be computed and added to or deducted from the contract quantity.

**304.8 Basis of Payment.** The accepted quantities of aggregate base course of the thickness and type specified will be paid for at the contract unit price for each of the pay items included in the contract. Payment will be considered full compensation for water used in performing this work. When bituminous pavement cold millings or recycled crushed concrete are substituted for aggregate base, payment will be made for the aggregate base quantity provided in the plans, regardless of whether millings, recycled crushed concrete or the aggregate base is used. Payment will be considered full compensation for hauling of millings, cold milling operations, and all other material or labor necessary to substitute bituminous pavement millings for aggregate base.



## SECTION 310

### AGGREGATE SURFACE

**310.1 Description.** This work shall consist of furnishing and placing chat, gravel or crushed stone surfacing in the quantity shown in the contract document or as directed by the engineer.

**310.2 Material.** All material shall be in accordance with Division 1000, Material Details, and specifically [Sec 1006](#). The type and gradation of the surfacing material to be used will be specified in the contract.

#### **310.3 Construction Requirements.**

**310.3.1 General.** The contractor shall furnish, haul and spread surfacing material on the subgrade at the designated rate. The rate of application may be varied at the discretion of the engineer, depending on the nature of the soil encountered in the subgrade. The contractor shall uniformly unload and distribute the required quantity of material throughout each station. The subgrade shall be prepared as specified in [Sec 209](#), and any work done in reshaping the subgrade before placing surfacing material shall be at the contractor's expense. When it is determined by the engineer to be to the Commission's advantage, hauling may be done over surfacing material previously spread, otherwise, all hauling shall be over the subgrade.

**310.3.2 Surface Requirements.** Material shall be spread to a uniform thickness over the subgrade and shaped as shown on the plans until the surface is free from ruts and waves. The surface shall be compacted under traffic. Maintenance of the surface shall continue until final project acceptance is made.

**310.3.3 Stockpiles.** Material shall be stockpiled at locations approved by the engineer, and in the approximate quantity shown on the contract.

**310.3.4 Salvage.** Designated areas shall be scarified to the full depth of the existing surfacing and such material pulverized to a maximum size of approximately 2 inches. Uncontaminated material shall be removed from the roadbed and placed in stockpiles or spread at locations approved by the engineer. Salvaged surfacing material shall be maintained as free as practical of dirt, vegetation or other objectionable material. Salvaging shall not be performed unless approved by the engineer.

**310.4. Vehicle Scales.** Vehicle scales shall be in accordance with [Sec 109](#).

**310.4 Quality Control.** The contractor shall control and monitor the quality of the work. No QC plan shall be required for aggregate surfacing work. QC for quantity less than 500 tons shall be governed by [Sec 1006](#).

**310.4.1 Gradation.** The gradation shall be determined and meet the requirements of [Sec 1006](#).

**310.4.2 Deleterious.** The deleterious content of the material shall be determined and meet the requirements of [Sec 1006](#).

**310.4.3 Durability.** The durability of the material shall be determined and meet the requirements of [Sec 1006](#).

**310.5 Quality Assurance.** The engineer or designated representative will be responsible for monitoring the work and quality control efforts of the contractor. Results of QA testing will be furnished to the contractor within 24 hours of testing be completed.

**310.5.1 Independent QA Samples.** Unless otherwise stated, a favorable comparison shall be obtained when independent QA samples meet the same specification criteria as QC.

**310.5.2 Split QA Samples.** No split samples are called for in [Sec 310](#).

**310.6 QC/QA Frequency Table.**

Tested Property	QC Frequency	QA Frequency	
		Independent Samples	Split Samples
Gradation	1 per 2000 tons	1 per Project	-
Deleterious			
Durability	1 per Material	-	

### 310.7 Method of Measurement.

**310.7.1 Measurement by Volume.** Stockpiles of salvaged surfacing material may be measured by the average end area method.

**310.7.2 Measurement of Aggregate Surfacing by Area.** Final measurement of the completed aggregate surface will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity. Where required, measurement of aggregate surface, complete in place, will be made to the nearest square yard. The revision or correction will be computed and added to or deducted from the contract quantity.

**310.7.3 Measurement by Weight.** Measurement will be made by weighing each truck load on scales in accordance with [Sec 109](#). Deductions will be made for any moisture in excess of 2.0 percent of the dry weight of the material. After deduction for excess moisture has been made, measurement will be made to the nearest ton for the total tonnage of material accepted.

**310.8 Basis of Payment.** The accepted quantities of aggregate surface will be paid for at the contract unit price.