

SECTION 301 GENERAL REQUIREMENTS FOR BASE AGGREGATES

301.1 Description

- (1) This section describes requirements common to aggregate bases constructed with crushed materials. Exceptions and additional requirements for crushed aggregate bases are specified in:
- Section 305 for dense graded bases.
 - Section 310 for open graded bases.

301.2 Materials

301.2.1 General

- (1) Provide coarse aggregates from a department-approved source as specified under 106.3.4.2.

301.2.2 Definitions

- (1) Interpret these terms, used throughout part 3, as follows:

Aggregate	A composite mixture of hard, durable mineral materials that have been mechanically processed.
Virgin materials	Mineral materials in a native or raw form, not previously used.
Gravel	Naturally occurring rounded particles of rock that will be retained on a No. 10 (2.0 mm) sieve.
Sand	Granular material having at least 90 percent passing the No. 4 (4.75 mm) sieve and predominantly retained on the No. 200 (75 µm) sieve.
Crushed stone	Crushed angular particles of rock retained on a No. 10 (2.0 mm) sieve.
Fractured face	An angular, rough, or broken particle surface with sharp edges.
Reprocessed material	Waste material for which a commercially demonstrated process uses the material as a raw material.
Reclaimed asphaltic material	Crushed or processed asphaltic pavement or surfacing recovered from a contractor designated source.
Salvaged asphaltic material	Crushed or processed asphaltic pavement or surfacing recovered from a department designated source.
Breaker run	Aggregate resulting from the mechanical crushing of quarried stone or reclaimed concrete not screened or processed after primary crushing.
Pit run	Unprocessed aggregate, with predominately 1 1/2 inch or larger sized particles, obtained from a gravel pit.
Select crushed material	Crushed and screened aggregate with particles predominately larger than 1 1/2 inches.

301.2.3 Sampling and Testing

- (1) Department and contractor testing shall conform to the following:

Sampling ^[1]	AASHTO T 2
Percent passing the 200 (75 µm) sieve ^[1]	AASHTO T 11
Gradation ^[1]	AASHTO T 27
Gradation of extracted aggregate.....	AASHTO T 30
Moisture content ^[1]	AASHTO T 255
Liquid limit.....	AASHTO T 89
Plasticity index.....	AASHTO T 90
Wear.....	AASHTO T 96
Sodium sulfate soundness ^[2]	AASHTO T 104
Freeze/thaw soundness.....	AASHTO T 103
Deleterious Materials ^[3]	AASHTO T 113 and CMM 4-25-50
Fracture.....	CMM 4-25-50
Moisture/density ^[1]	AASHTO T 99
In-place density ^[1]	AASHTO T 191

[1] As modified in CMM 4.

[2] Use aggregate retained on the No. 4 (4.75 mm) sieve using 5 cycles of the sodium sulfate soundness test.

[3] Use these tests to determine the acceptability of aggregates that have excessive deleterious material.

- (2) Contact the engineer to collect sample aggregates proposed for the project. The engineer and contractor will jointly obtain the sample. The sampler must be HTCP certified to sample aggregates. Do not place base until the engineer tests and approves the material, except as allowed in 106.1.

301.2.4 Aggregate Requirements

301.2.4.1 General

- (1) Furnish aggregates that are substantially free of deleterious materials.
- (2) The department may prohibit the use of crushed stone from limestone/dolomite deposits that have thinly bedded strata or strata of a shale nature. The department may also prohibit the use of aggregate from deposits or sources known to produce unacceptable material.

301.2.4.2 Aggregate Classifications

- (1) Provide aggregate conforming to one of the following classifications based on weight percentages.

Crushed stone or crushed gravel ≥ 85 percent virgin aggregates

Crushed concrete ≥ 90 percent crushed concrete that is free of steel reinforcement and includes < 10 percent asphaltic pavement or surfacing, base, or a combination of asphaltic pavement, surfacing, and base, incorporated during the removal operation.

Reclaimed asphaltic pavement ≥ 75 percent asphaltic pavement or surfacing.

Reprocessed material Consists of crushed concrete, reclaimed asphaltic pavement, crushed stone or gravel, or other construction materials that is thoroughly mixed and conforms to the following:

1. ≥ 80 percent is a combination of crushed concrete and asphaltic pavement or surfacing; where:
 - < 90 percent is crushed concrete, or else the material is classified as crushed concrete.
 - < 75 percent is reclaimed asphaltic pavement, or else the material is classified as reclaimed asphaltic pavement.
2. < 20 percent is crushed stone or gravel, concrete block, brick, cinder, or slag particles; where:
 - < 10 percent of the final mixture is concrete block particles.
 - < 5 percent of the final mixture is brick, cinder, or slag particles.

Blended material A blend of crushed stone, crushed gravel, crushed concrete, reclaimed asphaltic pavement, or reprocessed material thoroughly mixed and meeting the following:

1. Each individual component material, incorporated into the blend must meet the requirements of table 301-2 except for gradation. The final blend must conform to the specified gradation.
2. < 75 percent is reclaimed asphaltic pavement, or else the material is classified as reclaimed asphaltic pavement
3. < 90 percent is crushed concrete, or else the material is classified as crushed concrete.
4. < 80 percent is a combination of crushed concrete and asphaltic pavement or surfacing, or else the material is classified as reprocessed material.
5. < 85 percent is crushed stone or gravel, or else the material is classified as virgin aggregate.

301.2.4.3 Uses For Aggregate Classifications

- (1) The contractor may furnish the aggregate classifications, at the contractor's option, for the specified base types as allowed in table 301-1.

TABLE 301-1 USES FOR VARIOUS AGGREGATE BASE CLASSIFICATIONS

BASE TYPE	CRUSHED STONE and CRUSHED GRAVEL	CRUSHED CONCRETE	RECLAIMED ASPHALTIC PAVEMENT	REPROCESSED MATERIAL	BLENDED MATERIAL
Dense 3/4-inch	Yes	Yes	No	Yes ^[1]	Yes ^[1]
Dense 1 1/4-inch	Yes	Yes	Yes	Yes	Yes
Dense 3-inch	Yes	Yes	Yes	Yes	Yes
Open graded	Yes	Yes	No	No	No

^[1] The contractor may provide reprocessed material or blended material as 3/4-inch base only if the material contains 50 percent or less reclaimed asphaltic pavement, by weight.

301.2.4.4 By-Product Materials

- (1) The contractor may provide an aggregate with one of the following by-product materials mixed with crushed gravel, crushed concrete, or crushed stone up to the listed maximum percentage, by weight.

BY-PRODUCT MATERIAL	MAXIMUM PERCENTAGE (by weight)
Glass	12
Foundry slag	7
Steel mill slag	15
Bottom ash	8
Pottery cull	7

- (2) Furnish by-product materials substantially free of deleterious substances.
- (3) Crush, screen, and combine materials to create a uniform mixture conforming to the predominant material specifications.
- (4) If the aggregate contains a by-product material, the department will test the final product for gradation, wear, soundness, liquid limit, plasticity, and fracture as required for the predominant material.
- (5) Do not use aggregate containing a by-product material in the top 3 inches of a temporary or permanent aggregate wearing surface.

301.2.4.5 Aggregate Base Physical Properties

- (1) Furnish aggregates conforming to the following:

TABLE 301-2 AGGREGATE BASE PHYSICAL PROPERTIES

PROPERTY	CRUSHED STONE and CRUSHED GRAVEL	CRUSHED CONCRETE	RECLAIMED ASPHALTIC PAVEMENT	REPROCESSED MATERIAL	BLENDED MATERIAL
Gradation AASHTO T 27					
dense	305.2.2.1	305.2.2.1	305.2.2.2	305.2.2.1	305.2.2.1 ^[1]
open	310.2	310.2	----	----	----
Wear AASHTO T 96 loss by weight	≤50%	note ^[2]	----	note ^[2]	note ^[3]
Sodium sulfate soundness AASHTO T 104 loss by weight					
dense	≤18%	----	----	----	note ^[3]
open	≤12%	----	----	----	note ^[3]
Freeze/thaw soundness AASHTO T 103 loss by weight					
dense	≤18%	----	----	----	note ^[3]
open	≤18%	----	----	----	note ^[3]
Liquid limit AASHTO T 89	≤25	≤25	----	----	note ^[3]
Plasticity AASHTO T 90	≤6 ^[4]	≤6 ^[4]	----	----	note ^[3]
Fracture CMM 4-25-50 min one face by count					
dense	58%	58%	----	note ^[5]	note ^[3]
open	90%	90%	----	----	----

^[1] The final aggregate blend must conform to the specified gradation.

^[2] No requirement for material taken from within the project limits. Maximum of 50 percent loss, by weight, for material supplied from a source outside the project limits.

^[3] Required as specified for the individual component materials defined in columns 2 - 5 of the table before blending.

^[4] For base placed between old and new pavements, use crushed stone, crushed gravel, or crushed concrete with a plasticity index of 3 or less.

^[5] ≥75 percent by count of non-asphalt coated particles.

301.3 Construction

301.3.1 Equipment

- (1) Use specialized pneumatic or vibratory compaction equipment or a combination of both types of machines. Do not use tamping rollers. Use pneumatic compaction equipment conforming to 207.3.6.2. The engineer may allow the contractor to compact the shoulder foreslopes with other equipment.

301.3.2 Preparing the Foundation

- (1) Prepare the foundation, or resurface the previously placed base layer, as specified in section 211 before placing base. Do not place base on foundations that are soft, spongy, or covered by ice or snow. Do not place base on frozen foundations unless the engineer approves otherwise. Water and rework or re-compact dry foundations as necessary to ensure proper compaction, or as the engineer directs.

301.3.3 Stockpiling

- (1) If continuous compliance with material specifications is questionable, the engineer may require the contractor to supply material from a stockpile of previously tested material. Maintain a sufficiently large stockpile to preclude the use of material not previously approved.
- (2) Build and maintain stockpiles using methods that minimize segregation and prevent contamination. If the contract specifies location, place stockpiles where specified. Clear and prepare stockpile areas to facilitate the recovery of the maximum amount of stockpiled material.

301.3.4 Constructing Base

301.3.4.1 General

- (1) Place aggregate in a manner that minimizes hauling on the subgrade. Do not use vehicles or operations that damage the subgrade or in-place base. Deposit material in a manner that minimizes segregation.
- (2) Construct the base to the width and section the plans show. Shape, and compact the base surface to within 0.04 feet (12 mm) of the plan elevation.
- (3) Ensure there is adequate moisture in the aggregate during placing, shaping, and compacting to prevent segregation and achieve adequate compaction.
- (4) Maintain the base until paving over it, or until the engineer accepts the work, if paving is not part of the contract. The contractor is not responsible for maintaining material placed on detours, unless the special provisions specify otherwise.

301.3.4.2 Standard Compaction

- (1) Compact the base until there is no appreciable displacement, either laterally or longitudinally, under the compaction equipment. Route hauling equipment uniformly over previously placed base. Compact each layer before placing a subsequent layer. If the material is too dry to readily attain the required compaction, add water as necessary to achieve compaction.

301.3.4.3 Special Compaction

- (1) If the contract requires special compaction, compact each layer to 95 percent of maximum density, or more, before placing the subsequent layer. The engineer will determine the maximum density according to AASHTO T 99 method C or D and in-place density according to AASHTO T 191.

301.3.5 Excavation Below Subgrade

- (1) The engineer may request EBS in areas of placed base. Restore the surface in EBS areas to the plan grade and cross section or as the engineer directs.

301.3.6 Controlling Dust

- (1) Apply water or other engineer-approved dust control materials to control dust during construction and maintenance of the base and shoulders.

301.4 Measurement

301.4.1 General

- (1) For aggregate measured by the ton, the department will determine the weight based on contractor-provided tickets. Give the engineer a ticket, for each load delivered to the project, showing the net weight of the load, the type of material, the date, and project number.
- (2) For weighed aggregate delivered with a moisture content greater than 7 percent, the department will reduce the ticket weight by the weight of water exceeding 7 percent. The department will determine the aggregate moisture content based on and expressed as a percent of the aggregate dry weight.
- (3) For aggregate measured by the cubic yard, the department will determine the volume in the vehicle.

301.4.2 Alternate Measurement Procedures

- (1) The department may convert the measurement method from weight to volume or volume to weight as specified in 109.1. The engineer may adjust the conversion factor daily or with changing conditions, such as moisture content, as specified in 301.4.1.

301.5 Payment

- (1) Contractor testing for department approved aggregate sources is incidental to the work.
- (2) The department will only pay for engineer-approved EBS to correct problems beyond the contractor's control. Work performed under 105.3 to correct unacceptable work is the contractor's responsibility. For EBS performed after placing subbase or base in the EBS area, the department will pay for EBS as follows:
1. For excavation, the department will pay 3 times the contract unit price for the Excavation Common bid item under the EBS Post Placing Subbase or EBS Post Placing Base administrative item.
 2. For backfill and restoration with the materials the engineer directs, the department will pay 3 times the contract unit price for the bid items of each material used to fill the excavation and restore the subbase or base under the Restoration Post Completion administrative item.
 3. For excavation, backfill, or restoration work without contract bid items, as extra work.
- (3) Payment also includes water for compaction and dust control except, if the contract contains the Water bid item, the department will pay separately for compaction and dust control water under 624.5.