
Standard Specification for Reclaimed Concrete Aggregate for Unbound Soil–Aggregate Base Course

AASHTO Designation: M 319-02 (2023)

Technically Revised: 2002

Reviewed but Not Updated: 2023

Editorially Revised: 2023

Technical Subcommittee: 1a, Soil and Unbound Recycled Materials



American Association of State Highway and Transportation Officials
555 12th Street NW, Suite 1000
Washington, DC 20004

Standard Specification for

Reclaimed Concrete Aggregate for Unbound Soil–Aggregate Base Course

AASHTO Designation: M 319-02 (2023)

AASHTO

Technically Revised: 2002

Reviewed but Not Updated: 2023

Editorially Revised: 2023

Technical Subcommittee: 1a, Soil and Unbound Recycled Materials

1. SCOPE

1.1. This specification covers the use of reclaimed concrete aggregate as an unbound granular base course material. When properly processed, hauled, spread, and compacted on a prepared grade to appropriate density standards, reclaimed concrete aggregate used alone or blended with natural or crushed aggregate can be expected to provide adequate stability and load support for use as road or highway base courses. The approach presented in this specification is suitable for the satisfactory installation of a reclaimed concrete aggregate base course. However, local experience, practices, or materials that have been successfully applied may be used in lieu of this specification. This specification is not intended for use in base courses in locations where surfacing will not be placed over the base course.

1.2. Since reclaimed concrete aggregate is a recycled material, various state and local jurisdiction laws and regulations may be applicable. The user of this specification is cautioned to contact state and local environmental and other local regulators to determine what requirements are appropriate.

1.3. The values stated in SI units are to be regarded as the standard. The English unit equivalents shown in parentheses may be appropriate, except with regard to sieve sizes and aggregate size as determined by the use of testing sieves, in which case the standard SI designation shown is the standard, as required by ASTM E11.

Note 1—The engineer is cautioned to provide appropriate construction specifications to ensure compaction to an extent that further densification of the compacted pavement from traffic loadings will be insignificant. At the time of placement, the reclaimed concrete aggregate material shall contain moisture approximately equal to the optimum moisture content necessary to make certain that the design density requirements are obtained when the material is compacted. Reclaimed concrete aggregate can be expected to exhibit higher absorption than natural aggregate materials. Accordingly, the engineer should expect to experience moderately higher optimum moisture content values than would be expected with natural aggregate materials. The reclaimed concrete aggregate shall be compacted using vibratory or other proven effective rollers or tampers to achieve the required density results. Further discussion of compaction issues is presented in Appendix X1.

Note 2—The engineer should be aware of the highly alkaline nature of reclaimed concrete aggregate, the relatively high degree of solubility of these alkaline materials, and the potential increase in pH that could occur in waters percolating through a reclaimed concrete aggregate base. Depending on the sensitivity of local soils, surface waters, and groundwater to the presence of alkaline material, the engineer should set appropriate limits on the proximity of placement of reclaimed concrete aggregate relative to groundwater and surface waters. Additionally, the presence of water percolating through reclaimed concrete aggregate will induce a corrosive solution with a pH of approximately 11 to 12. Therefore, reclaimed concrete aggregate shall not be

used in the vicinity of metal culverts, such as aluminum culverts, that are sensitive to highly alkaline environments.

Note 3—The engineer is cautioned to prevent, or minimize when possible, the use of reclaimed concrete aggregate over a geotextile drainage layer, gravel drain fields, drain field piping, or open soil-lined stormwater retention or detention facilities. Soluble minerals rich in calcium salts and calcium hydroxide can be hydraulically transported from the reclaimed concrete aggregate material. When this occurs and the reclaimed concrete aggregate is located above such porous drainage systems, there is a tendency for the referenced minerals to precipitate out of solution and bind the drainage structure. The mineral deposits formed are sometimes referred to as tufa-like or portlandite deposits. Over time the permeability of the drainage system can be reduced. Further discussion of this topic and recommended drainage evaluation procedures are presented in Appendix X2.

Note 4—The engineer should be aware that reclaimed concrete aggregate used as a base course could, with time, gain strength and exhibit a corresponding loss of permeability in the base course layer. This is due to residual cementitious reactions in the concrete material. If the base course is intended for use as a drainage layer, then the fine portion of the reclaimed concrete aggregate should be removed or modified to reduce the potential for this occurrence.

Note 5—The engineer is cautioned that some reclaimed concrete aggregate materials will yield high soundness loss values when subjected to conventional sulfate soundness testing methods, and such testing methods may not be suitable for reclaimed concrete aggregate soundness testing. Further discussion of this topic is presented in Section 6.3 and Appendix X3.

Note 6—The engineer is cautioned to ensure that reclaimed concrete source materials are not contaminated with extraneous solid waste or hazardous materials. Methods and criteria for examining and approving reclaimed concrete materials prior to use should be established by the specifying jurisdiction. This provision is further addressed in Section 7.3.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards:*

- < M 146, Terms Relating to Subgrade, Soil–Aggregate, and Fill Materials
- < M 147, Materials for Aggregate and Soil–Aggregate Subbase, Base, and Surface Courses
- < R 58, Dry Preparation of Disturbed Soil and Soil–Aggregate Samples for Test
- < R 90, Sampling Aggregate Products
- < T 11, Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
- < T 27, Sieve Analysis of Fine and Coarse Aggregates
- < T 88, Particle Size Analysis of Soils
- < T 89, Determining the Liquid Limit of Soils
- < T 90, Determining the Plastic Limit and Plasticity Index of Soils
- < T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- < T 103, Soundness of Aggregates by Freezing and Thawing
- < T 104, Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
- < T 176, Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
- < T 193, The California Bearing Ratio
- < T 307, Determining the Resilient Modulus of Soils and Aggregate Materials

2.2. *ASTM Standards:*

- < D2940/D2940M, Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports