

Technical Note

TN 6.20 Recycled Concrete Structural Backfill

General

The structural integrity of buried flexible structures is dependent upon both the strength of the flexible structure and the strength of the surrounding soils. The StormTech Design Manual provides a list of “Acceptable Fill Materials” that have been found to provide proper structural support for StormTech chambers. This table presumes competent stone such that the stone is sufficiently hard and durable to provide long-term structural stability. Recycled, crushed concrete (also referred to as Reclaimed Concrete Material – RCM) may provide an excellent structural backfill but hardness and durability characteristics vary depending on the mix design. To qualify recycled, crushed concrete for a particular application, the consulting engineer may require hardness and durability testing. Similarly, natural limestone materials vary in hardness and durability depending on the source and in some cases, testing may be desirable. This Tech Sheet provides guidance for the acceptability of recycled crushed concrete and limestone as competent structural foundation (bedding) and embedment materials for StormTech chambers.

This sheet addresses structural competency. It is possible that some materials that are found to be competent may contribute to occlusion of separation fabrics or blocking of infiltration / exfiltration surfaces such as the case of Tufa precipitate from unhydrated cement. It may also be appropriate to consider other criteria such as chemical content, alkalinity and potential toxicity. The project engineer may choose to establish additional criteria that may be appropriate for the application.

The following are specifications that StormTech recommends for the acceptance of reclaimed crushed concrete based on criteria for structural integrity.

1. Gradation: The gradation shall meet AASHTO M43 gradations as listed in the “Acceptable Fill Materials Table” in the StormTech Design Manual. Note that the material shall be processed such that fines are 5% or less.
2. The material shall meet ASTM D2488 angular or subangular classification.
3. Deleterious materials shall be limited to: a) maximum 20% reclaimed pavement materials and b) maximum 0.15% building materials.
4. Material hardness – Maximum loss of 40% in the LA Abrasion test (AASHTO T96)
5. Freeze-Thaw Resistance – Maximum 12% loss after 5 cycles in magnesium sulfate solution (AASHTO T104)
6. The design shall be in accordance with the StormTech Design Manual and Installation shall be in accordance with the StormTech Installation Instructions.

Please note:

1. The AASHTO designations listed in the acceptable fill materials table in the StormTech Design Manual are for gradations only. The stone must also be clean, crushed angular. For example, a specification for #4 stone would state: “Clean, crushed, angular No. 4 (AASHTO M43) stone”.

This guidance applies to material locations A and B shown below where A is the Foundation Stone below the chambers and B is the Embedment Stone surrounding and above the chambers.

