

# Tech Sheet



## Recycled Concrete Structural Backfill

Tech Sheet # 4  
Rev. 2/16/10

### General:

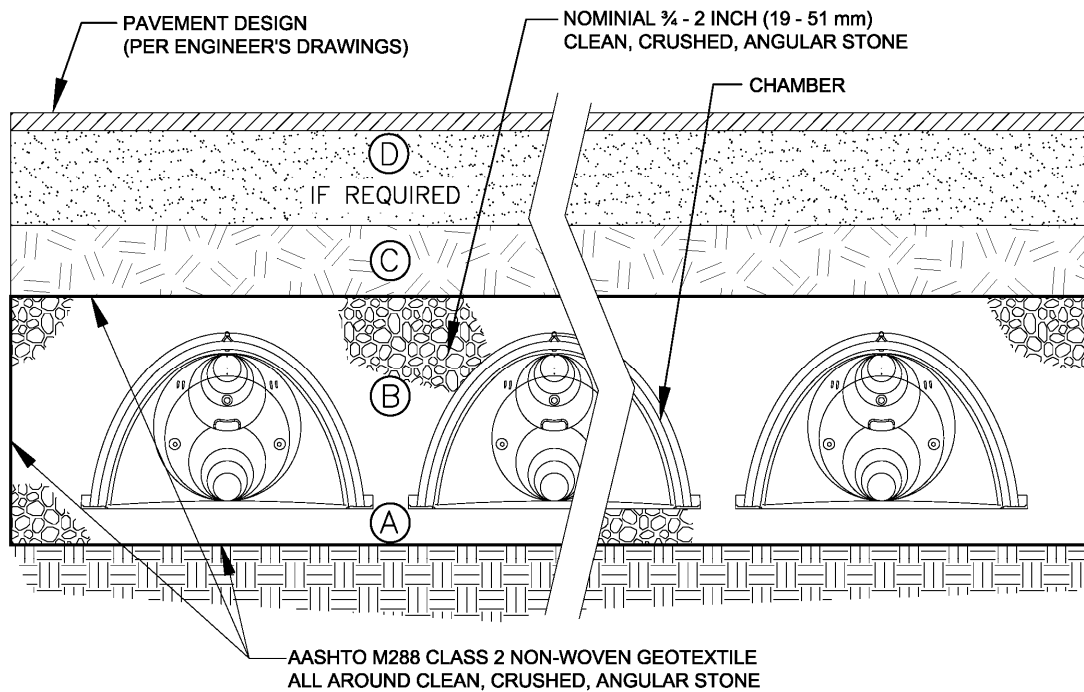
The structural integrity of buried flexible structures is dependent upon both the strength of the flexible structure and the strength of the surrounding soils. Table 2 of the StormTech Design Manual provides a list of “Acceptable Fill Materials” that have been found to provide proper structural support for StormTech chambers. Table 2 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 “Table 2 – Acceptable Fill Materials” 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.

This guidance applies to material locations A and B shown below (Figure 5 in the StormTech Design Manual) where A is the *Foundation Stone* below the chambers and B is the *Embedment Stone* surrounding and above the chambers.



\*SEE STORMTECH DESIGN MANUAL

### Acceptable Fill Materials

| MATERIAL LOCATION | DESCRIPTION   | AASHTO M43 DESIGNATION <sup>(1)</sup>                     | COMPACTION/DENSITY REQUIREMENT  |
|-------------------|---|---|---|
| Ⓓ                 | FILL MATERIAL FOR LAYER D STARTS FROM THE TOP OF THE C LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISH GRADE ABOVE. NOTE THAT PAVEMENT SUB-BASE MAY BE PART OF THIS LAYER.             | N/A   | PREPARE PER ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.                                     |
| Ⓒ                 | FILL MATERIAL FOR LAYER C STARTS FROM THE TOP OF THE EMBEDMENT STONE (B LAYER) TO THE MINIMUM COVER HEIGHT ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUB-BASE MAY BE A PART OF THIS LAYER. | 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10 | PLEASE SEE THE SPECIFIC CHAMBER MODEL'S INSTALLATION INSTRUCTIONS FOR INFORMATION REGARDING COMPACTION AND DENSITY REQUIREMENTS FOR THIS LAYER. |
| Ⓑ                 | EMBEDMENT STONE SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE (A LAYER) TO THE C LAYER ABOVE.  | 3, 357, 4, 467, 5, 56, 57                                 | NO COMPACTION REQUIRED.   |
| Ⓐ                 | FOUNDATION STONE BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.   | 3, 35, 4, 467, 5, 56, 57                                  | PLATE COMPACT OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY <sup>(2)</sup> .  |

Please note:

1. The listed AASHTO designations 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".
2. As an alternate to proctor testing and field density measurements in open graded stone, StormTech compaction requirements are met for 'A' location materials when placed and compacted in 9" (229 mm) (max) lifts using two full passes with an appropriate compactor.