

Recycled Concrete Structural Backfill

Tech Sheet # 4
Rev. 1/16/06

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 LandSaver Design Manual provides a list of “Acceptable Fill Materials” that have been found to provide proper structural support for LandSaver 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 may vary depending on the mix design. It is necessary to ensure that the particular recycled, crushed concrete proposed is structurally competent before being used as a structural backfill for LandSaver chambers. Similarly, natural limestone materials vary in hardness and durability depending on the source and in some cases, competency should be verified. This Tech Sheet provides guidance for the acceptability of recycled crushed concrete and limestone as competent structural foundation (bedding) and embedment materials for LandSaver chambers.

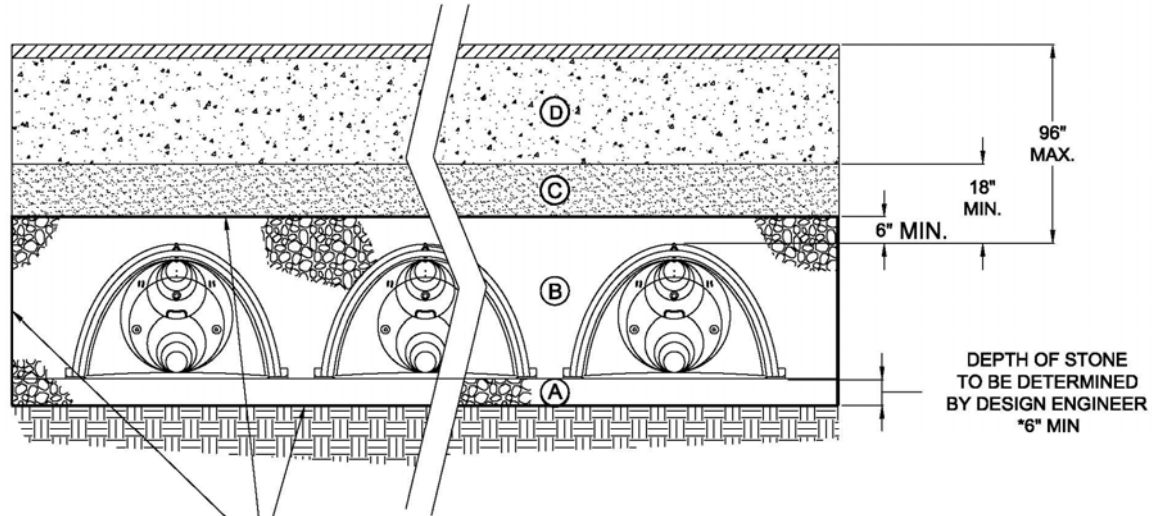
This sheet addresses structural competency. It is possible that some materials that are found to be competent may contribute to occlusion of separation fabrics or blocking of infiltration / exfiltration surfaces such as the case of Tufa precipitate from unhydrated cement. It may also be appropriate to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

Following are specifications that LandSaver 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 LandSaver 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)

- The design shall be in accordance with the LandSaver Design Manual and Installation shall be in accordance with the LandSaver Installation Instructions.

This guidance applies to material locations A and B shown below (Figure 5 in the LandSaver Design Manual) where A is the *Foundation Stone* below the chambers and B is the *Embedment Stone* surrounding and to a 6" elevation above the chambers.



AASHTO M288 CLASS 2
 NON-WOVEN GEOTEXTILE
 ALL AROUND ANGULAR STONE

*SEE LANDSAVER DESIGN MANUAL

**ACCEPTABLE FILL MATERIALS
 LANDSAVER LS-1633 AND LS-3051 CHAMBER SYSTEMS**

MATERIAL LOCATION	DESCRIPTION	AASHTO M43 DESIGNATION	AASHTO M145 DESIGNATION	COMPACTION/DENSITY REQUIREMENT
Ⓓ FILL MATERIAL FROM 18" TO GRADE ABOVE CHAMBERS	ANY SOIL/ROCK MATERIALS, NATIVE SOILS OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	N/A	PREPARE PER ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
Ⓒ FILL MATERIAL FOR 6" TO 18" ELEVATION ABOVE CHAMBERS (24" FOR UNPAVED INSTALLATIONS)	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES.	3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	A-1 A-2 A-3	COMPACT IN 6" LIFTS TO A MINIMUM 95% STANDARD PROCTOR DENSITY. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 LBS. DYNAMIC FORCE NOT TO EXCEED 20,000 LBS.
Ⓑ EMBEDMENT STONE SURROUNDING AND TO A 6" ELEVATION ABOVE CHAMBERS	WASHED ANGULAR STONE WITH THE MAJORITY OF PARTICLES BETWEEN ¾ - 2 INCH	3, 357, 4, 467, 5, 56, 57	N/A	NO COMPACTION REQUIRED
Ⓐ FOUNDATION STONE BELOW CHAMBERS	WASHED ANGULAR STONE WITH THE MAJORITY OF PARTICLES BETWEEN ¾ - 2 INCH	3, 357, 4, 467, 5, 56, 57	N/A	PLATE COMPACT OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY

PLEASE NOTE: THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CRUSHED, ANGULAR. FOR EXAMPLE, THE STONE MUST BE SPECIFIED AS CRUSHED, ANGULAR NO. 4 STONE.