

Structural Backfill Porosity Defined

Porosity (n) is a geotechnical term used to provide a numerical measure of void space or voids in soil or backfill material. Porosity = $n = \text{Volume of Voids} / \text{Total Volume of sample}$.

Structural Backfill Porosity Guidelines

For the purposes of estimating storage capacity of backfill surrounding detention and / or infiltration systems, a porosity of 40% is commonly used. This 40% figure is an industry base standard used for most estimating of a clean and open graded angular backfill. 40% is also the most commonly found porosity value in agencies' stormwater design manuals. As regional materials and accepted porosity values may slightly differ, the Engineer of Record shall verify backfill type specified and actual porosity.

The storage capacity for the bedding and embedment zones around the detention and / or infiltration zones can be estimated once the appropriate porosity has been determined for the project and approved by the Engineer of Record. The porosity of backfill material can be protected from soil migration by utilizing an appropriately selected geotextile that surrounds the entire system.

Pretreatment is a preferred practice for all detention and infiltration systems where storage capacity is dependent upon the bedding and embedment zones, otherwise a more conservative porosity may be recommended.

Commonly Cited Porosity References

WEF (Water Environment Federation), Manual of Practice (MOP) 23, Design of Urban Stormwater Controls

- Table 5.12 lists uniform sized gravel at 40% porosity.

Controlling Urban Runoff, Thomas R Schueler

- Describes storage volume of the void space in the trench at 40% of the excavated trench volume.

On-site Stormwater Management: Applications for Landscape and Engineering, Second Edition, Bruce Ferguson and Thomas Debo

- Open graded crushed stone has 40% void space.

Note – please refer to your local stormwater design manual for regional requirements.