

Permeable Hard-scapes

Permeable Hard-scapes are alternative paving surfaces that capture and temporarily store stormwater by filtering runoff through holes in the pavement surface into an underlying stone reservoir. Filtered runoff may be collected and returned to the stormwater system, or allowed to partially soak into the soil. "Permeable Hard-scapes" refers to Pervious Concrete, Porous Asphalt, Concrete Grid Pavers, Permeable Interlocking Concrete Pavers and other products and configurations that are designed to infiltrate water.



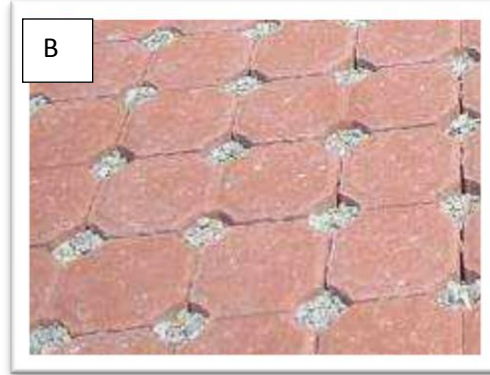
- Permeable hard-scapes will reduce the amount of runoff when they replace existing hard surfaces. (i.e. an existing patio or driveway).
- If the permeable hard-scape is a NEW hard surface, it will help prevent the site from increasing stormwater runoff but does not reduce stormwater runoff from the prior condition.
- Permeable hard-scapes allow homeowners to reduce overall imperviousness and stormwater runoff while continuing to maintain hardened areas such as driveways, sidewalks, and patios.

Practice Considerations	
Cost	High
Installation Difficulty	High
Effectiveness for reducing runoff	Medium

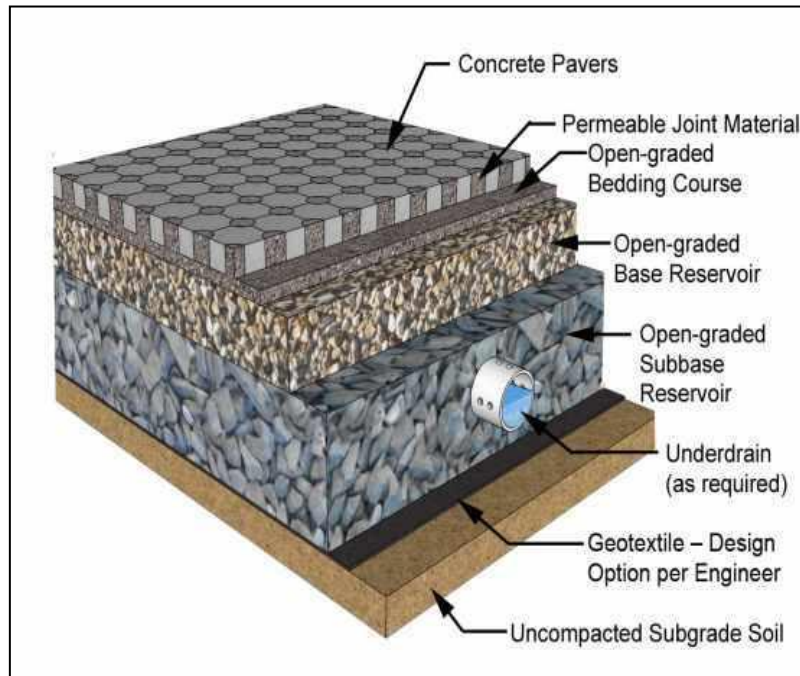
Homeowner Guide for a More Bay- Friendly Property



Concrete Grid Pavers



Permeable Interlocking Concrete Pavers



Schematic Profile for Typical Permeable Pavement Section

Where should I put my permeable hard-scape?

The following table discusses several site conditions that need to be considered prior to determining whether a particular location is suitable for a permeable hard-scape.

Site Considerations		
Site Condition	Feasible	Notes
Steep Slopes	No	Steep pavement surface slopes may cause shifting of the pavement surface and base materials. In general, slopes greater than 5% do not make good candidates for permeable hard-scapes.
External Drainage	Yes	The area of pavement or rooftop draining onto ("run-on") should be no more than 2 times the area of permeable hard-scape. *
High Water Table	No	The bottom of the permeable hard-scape installation (i.e., the bottom of the excavated area) must be at least 2 ft. above the seasonal high water table.
Poor Soil Condition	Yes	Soil conditions do not typically constrain the use of permeable hard-scape although they do determine whether an underdrain is needed. This practice is best if the soil has good drainage.
Floodplain	No	Permeable hard-scape should not be constructed within the 100-year floodplain
Adjacent Structures	Yes	To avoid the risk of seepage, permeable hard-scapes should not be connected to structures so that water cannot seep into basements or damage foundations.
Utilities	Yes/No	Interference with underground utilities should be avoided whenever possible. Approval from the applicable utility company or agency is required if utility lines will run below or immediately adjacent to a permeable hard-scape.
<p><i>*Only paved or stable impervious surfaces should be allowed to drain onto ("run-on") pervious hard-scape. Turf, mulch, and other non-paved areas contribute large amounts of sediment to the pervious hard-scape which can increase the likelihood of clogging and the need for vacuum maintenance. Look at the existing surface, if it is covered in organic material (from overhead trees or similar) it may not be a good candidate for a permeable hard-scape.</i></p>		

How do I install (or use) my permeable hard-scape?

Due to the increased complexity of permeable hard-scapes and the need for some specialty equipment it is **strongly recommended that homeowners work with a trained and certified contractor** (Pervious Concrete Contractor Certification Program or PCCP Installer Technician training program, etc.) to implement this type of project.

Step 1: Construction of the permeable hard-scape shall only begin after the area surrounding the pervious hard-scape has been stabilized. The proposed site should be checked for existing utilities prior to any excavation. Do not install the system in rain or snow, and do not install frozen aggregate materials.

Step 2: Temporary erosion and sediment controls are needed during installation to divert stormwater away from the permeable hard-scape until it is completed. The proposed permeable hard-scape must be kept free from sediment during the entire construction process. Construction materials contaminated by sediments must be removed and replaced with clean materials.

Step 3: Compaction of the bottom of the permeable hard-scape should be avoided to the extent possible. Excavators or backhoes should work from the sides to excavate to the appropriate design depth and dimensions.

Step 4: The native soils along the bottom of the permeable hard-scape should be scarified or tilled to a depth of 3 to 4 inches prior to the placement of stone.

Step 5: Filter fabric should be placed only as required by the design.

Step 6: Moisten and spread the appropriate clean, washed stone aggregate (usually No. 2 or No. 57 stone) 6-inches at a time to the desired depth. Place at least 2 inches of additional aggregate above the underdrain, and then compact it.

Step 7: Paving materials shall be installed in accordance with manufacturer or industry specifications for the particular type of pavement.

- Pavers may be placed by hand or with mechanical installers.
- Fill gaps at the edge of the paved areas with cut pavers or edge units.
- Fill the joints and openings with stone. Joint openings must be filled per the paver manufacturer's recommendation.
- Compact and seat the pavers into the bedding course.
- Thoroughly sweep the surface after construction to remove all excess aggregate.

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Step 8: Inspect the area for settlement. Any pavers that settle or are not level must be inspected and reinstalled.

Step 9: Within 6 months, top up the paver joints with stones.

How do I care for my permeable hard-scape?

Maintenance is a crucial element to ensure the long-term performance of permeable hard-scape. The most frequently cited maintenance problem is surface clogging caused by organic matter (leaves, grass clippings, etc.) and sediment. Periodic sweeping will remove accumulated sediment and help prevent clogging; however, it is also critical to ensure that surrounding land areas remain stabilized.

The following tasks must be avoided on ALL permeable hard-scapes:

- Sanding
- Re-sealing
- Re-surfacing
- Power washing
- Storage of snow piles containing sand
- Storage of mulch or soil materials

Maintenance Frequency of Permeable Hard-scapes Based on Type of Application and Maintenance Method		
Maintenance Task	Type of Application	Frequency
Dry Sweeping	Patio	Seasonally (4 X per year)
Dry Sweeping	Driveway	Monthly
Vacuum	Patio	Every 2 years
Vacuum	Driveway	Once per year
<i>*This table is intended as guidance only; the frequency should be adjusted based on conditions and the surrounding land cover (e.g. pavement, turf, trees) and level of detritus and sediment on the pavement surface.</i>		

The frequency of maintenance will depend largely on the pavement use (patio vs. driveway) and traffic loads (foot vs. vehicle). Dry-weather sweeping in the spring and fall months is important. For peak performance, every few years sweep with a dry vacuum sweeper. Do not use a pressure washer or high pressure water spray, since spraying may lead to subsurface clogging.

Resources

The following are several permeable hard-scape resources for homeowners.

- NRMCA Certified Professional Pervious Concrete Contractor Database:
http://nrmca.org/Education/Certifications/Certs_DB_Disclaimer.htm
- Interlocking Concrete Pavement Institute Certified Contractor Member Search:
- Permeable Pavers Factsheet Montgomery County, MD:
- Previous Surfaces Factsheet Arlington County,VA: