PHB TechBullet #16
Permeable Pavement Maintenance



Permeable pavements will last for 20-25 years with proper construction and maintenance. Maintaining surface infiltration and resulting exfiltration is key to long-term pavement performance.

Stormwater collection systems (BMPs) are designed to capture rainwater runoff containing suspended solids, nutrients and pollutants. All these systems require periodic maintenance to insure infiltration and storage capacity. Permeable pavements are no exception. Recent studies (Borgwardt) indicate that permeable systems using open graded aggregates can retain as much as 20% of their initial infiltration rates even after an extended periods (10 years) without maintenance. This is not to suggest that these systems require no or little maintenance but that the myth of clogging has been exaggerated with permeable segmental pavements.

Clogging is dependent on several factors: traffic frequency, close proximity to sediment, surrounding soil permeability, nearby disturbed soil, and frequency of maintenance. It is important to note that clogging doesn't mean zero infiltration as noted above.

PREVENTATIVE MAINTENANCE

One of the most effective methods to reduce clogging is to watch out for potential sources of unwanted sediment such as nearby or adjacent beds containing loose mulch or soil. Care should be taken to avoid runoff through these areas or to retain the sediment through additional vegetation. Permeable pavements should be inspected after major storms for heavy sediment that may have been tracked to the surface and that sediment should be removed.

Permeable pavements should be observed periodically during rain events for proper water infiltration into the system and observation pipes (if present) should be inspected at least once per year to verify water flow & exfiltration.

JOINT & VOID CLEANING

Removing sediment and debris from the joint/void opening will greatly increase surface infiltration (James, Hunt) It is common that a debris "chip" will form in the top part of the joint and this chip is best removed through light vacuuming on an annual or semi-annual basis.

Recent analysis at the Morton Arboretum permeable pavement site (near Chicago) indicate that most debris is retained in the top 1 ½" of the joint. Every 3-5 years or as dictated by observation of infiltration, the debris (some #89 stone in joints will also be removed) in the top 1 ½" should be removed and new replacement #89 stone be swept into the joints until full. Vacuum trucks designed for pavement cleaning at malls and shopping center parking areas best perform this process. Vacuum equipment with adjustable vacuum suction is preferred because debris removal is more precise and minimizes the amount of chip stone replacement. The pavement system should be dry before cleaning.





Pressure washers are not recommended on permeable pavements due to the potential to drive debris further down into the aggregate layers below and the tendency for material to be moved around and not removed. For this reason, vacuum trucks should not use sweep brooms or water spray attachments.

PAVEMENT REPAIR

A distinct advantage to segmental pavements is the ease of repair. The pavement elements can be picked up, removed and reinstated once the repair is made. Settlement areas exceeding ½" and any protruding pavers that lip by more than ¼" from surrounding pavers should be picked up and re-laid after base or bed layers are repaired. Of course, any pavers that are badly damaged should be removed and replaced with new pavers.

CLAY PAVER MAINTENANCE

Clay pavers require no special maintenance as natural weathering keeps most clay paving systems clean and beautiful.

For specific cleaning situations like oil stains or spills, use commercial cleaners generally available at masonry supply outlets. When using any type of cleaner, always test on a small hidden portion of the pavement. Pre-wet the pavement thoroughly before cleaning and rinse after with clean water. The use of some acid cleaners may cause staining in some types of clay pavers. Vanatrol or 202V Vana-Stop or an equivalent product should be used to clean all light colored and brown pavers. DO NOT USE MURIATIC ACID.

Sealers should not be used on a permeable pavement due to the potential of compromising infiltration through the void areas.

SNOW REMOVAL & DEICING



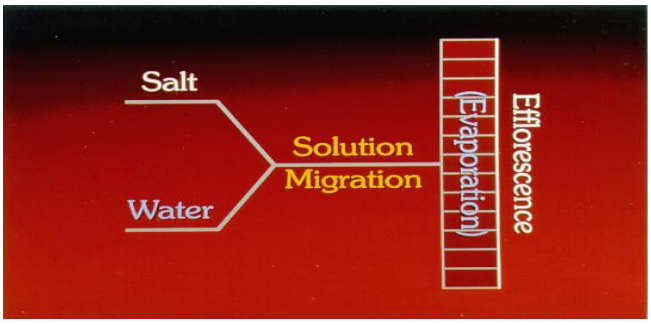
Snow and ice can be removed with normal hand equipment or motorized vehicles. Snowplow blades should be equipped with a rubber edge and set @ 1/4" above the pavement. Rotary brushes and snow blowers can also be used. The use of rock salts or sodium based deicers can be used but are likely to produce efflorescence for a period of time. Pure magnesium chloride is a premium de-icer shown to not effloresce in lab testing. Sand used for traction should be avoided as the sand will increase clogging. Fortunately, plowed permeable systems tend to stay drier with minimal ice due to the natural draining of the pavement and to the transfer of warmer air from below the frost line to the surface (depends on base thickness).

EFFLORESCENCE



Efflorescence is a white powder residue produced by common salt sources such as de-icer & snow melt products, cement products or certain types of aggregates. The residue shows up on the paver surface through water evaporation even though the salt rarely comes from the paver itself. Avoiding sources of common soluble salts in the paving system is the best way to prevent efflorescence.

HOW EFFLORESCENCE OCCURS



COMMON SALT SOURCES

Base Aggregates like limestone
Bedding Sands like stone screenings
Snow Melt Products like rock salt
Cement Products like concrete & mortar
Treated Water
Fertilizers
Pre-emergent Weed Killers

BEST PRACTICES

- Avoid salt carrying aggregates like limestone. ***Limestone aggregates and manufactured sands should not be used if efflorescence is a concern.***

- Educate the customer in advance that certain situations or products will cause efflorescence to appear on the paver but it will go away as salts dissipate. In the case of salt carrying aggregates, the salts may never fully dissipate.
- Recommend magnesium chloride de-icer products (MagChloride). This premium type de-icer works better in colder temperatures as well as minimizes efflorescence later.

EFFLORESCENCE REMOVAL

- Vacuum the salt powder if possible. Then, flush the surface with water, preferably downgrade, to wash the salt away from the pavement surface. This process will need to be repeated, after drying, as some salts will get re-absorbed into the pavers and the salt will reappear when water evaporates.
- If the salt does not disappear in contact with water, the salt stain will need to be removed by a special cleaner like ***ProSoCo's Light Duty Concrete Cleaner***.

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